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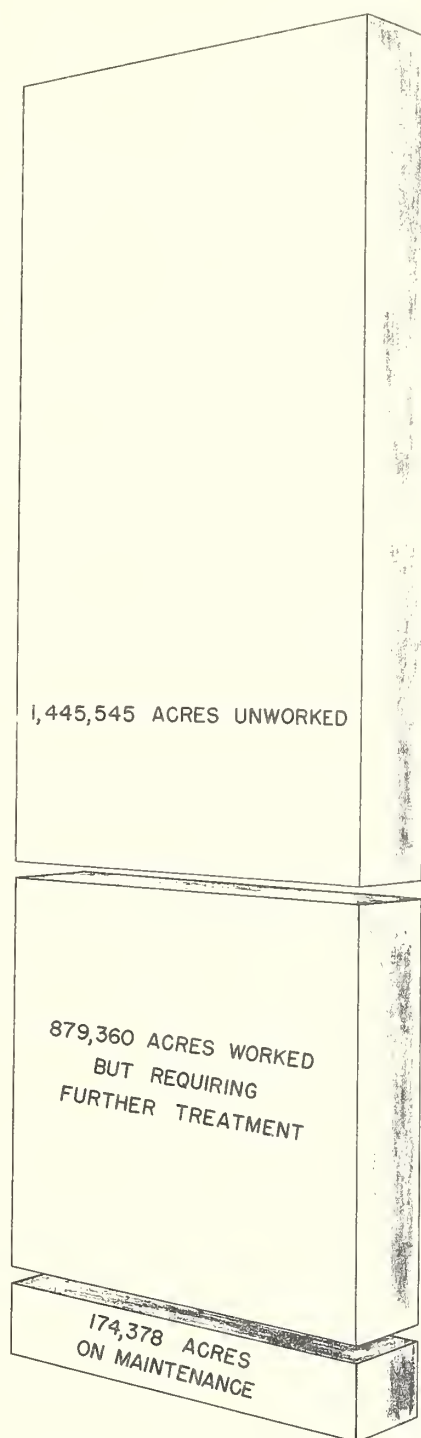
ANNUAL REPORT
ON
THE CONTROL OF WHITE PINE BLISTER RUST
IN THE
PACIFIC COAST REGION
FOR THE
CALENDAR YEAR 1947

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March 1948



STATUS OF CONTROL
IN THE
PACIFIC COAST REGION
1947

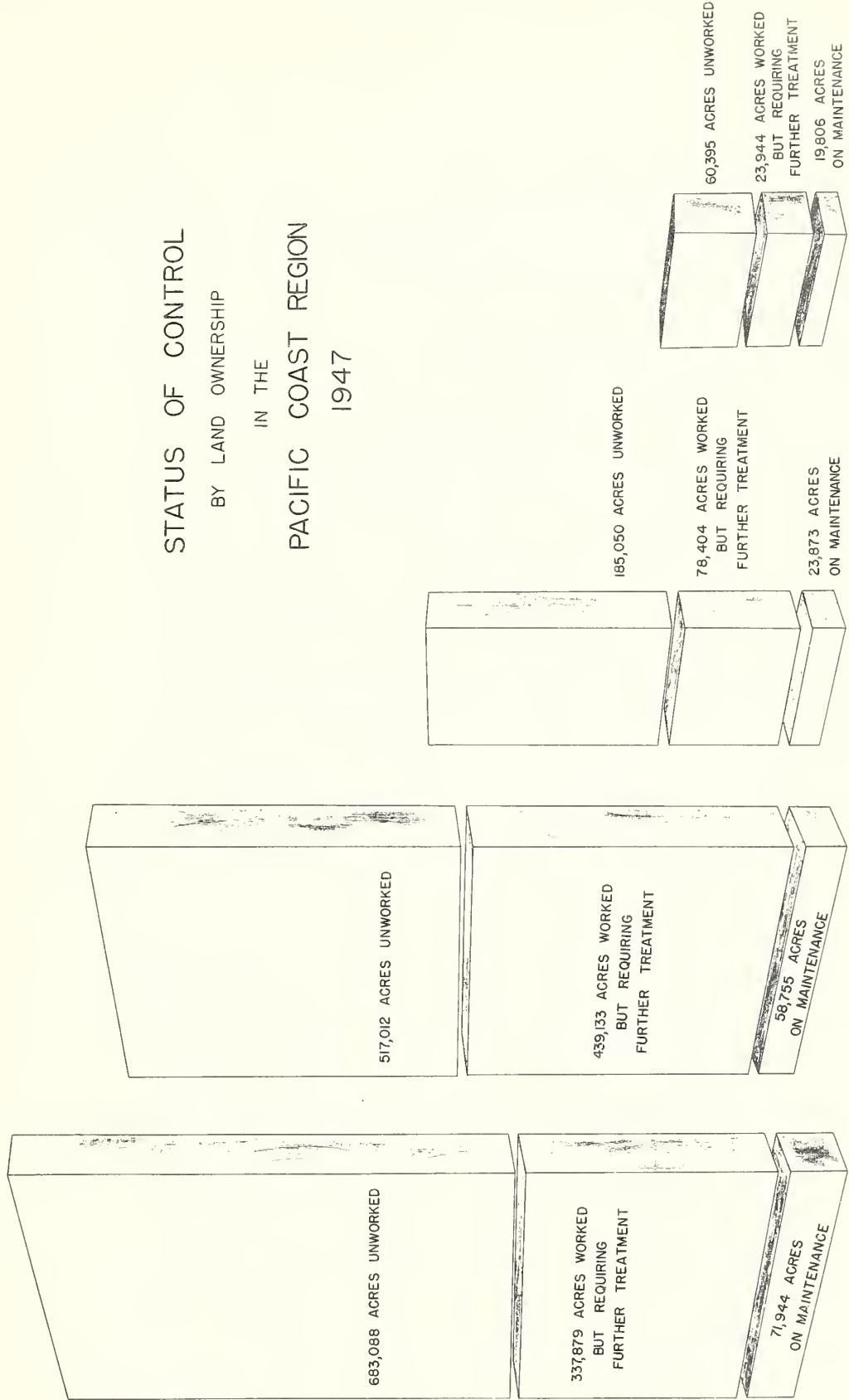
STATUS OF CONTROL

BY LAND OWNERSHIP

IN THE

PACIFIC COAST REGION

1947



U.S. FOREST SERVICE

STATE & PRIVATE

NATIONAL PARK SERVICE

O & C

REVESTED LANDS
ADMINISTRATION

C O N T E N T S

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WHITE PINE BLISTER RUST CONTROL IN THE PACIFIC COAST REGION

ANNUAL REPORT FOR 1947

PART I

HIGHLIGHTS OF 1947

By

Warren V. Benedict, Regional Leader

It will be recalled that for fiscal 1947 Federal funds were appropriated in amounts sufficient to do control work for lands of all ownerships on a predetermined programmed basis. Such a program was short lived. For fiscal 1948 (C.Y. 1947) Federal blister-rust-control appropriations were sharply reduced on the state and private lands project, and their use restricted to a 50-50 matching basis. Had it not been for the strong financial support extended by the State of California the program on state and private lands in the region would have been forced to close July 1. This would have rendered impossible the coordination of one uniform control program where the intermingled pattern of land tenure is such that the full success of control hinges so much on operating on a complete land coverage basis. The State of California thus assumed a key role in holding the control program in proper land ownership balance.

Allocation of funds to the cooperative project for work on state and private lands for fiscal 1948 totaled \$260,000; \$125,000 from the State of California, \$5,000 from the lumber industry, and \$130,000 Federal funds to the Bureau of Entomology and Plant Quarantine. Also \$65,000 of state and private funds from the cooperative account of fiscal 1947 were carried over into fiscal 1948 to aid in keeping in operation as long as possible the 11 cooperative camps opened during the spring period. These camps had to be closed in August when the season's allocation of funds were depleted.

The reduction in funds allocated to Federal agencies for control work on Federal lands was modest, and but slight adjustments in the field program were necessary. Forest Service of Region 5 received an allotment of \$650,000, Forest Service of Region 6 received \$100,000, National Park Service received \$255,000, and the O & C Revested Lands Administration received \$93,000.

With these funds, plus spring balances from 1947 fiscal year allotments, the four operating agencies engaged in control work in the region employed a total of 2,073 seasonal workers during the peak period. These workers were quartered in 43 camps, distributed by agency as follows:

U. S. Forest Service	19 camps, 909 employees
National Park Service	8 camps, 425 employees
O & C Revested Lands Administration	3 camps, 100 employees
*EPQ - Coop.	13 camps, 639 employees

*The cooperative project operated by the Bureau of Entomology and Plant Quarantine on lands largely in state and private ownership, with funds allocated from Federal, state, and private sources.

Accomplishments

Tables 1 and 2 outline briefly accomplishments in ribes eradication during 1947 and table 3 shows the accumulated progress over the 14 years control work has been under way in the region.

In 1947 the total acreage treated exceeded by 31 per cent the amount for 1946 while expenditures increased 24-1/2 per cent. Due to higher operating expenses, the cost per effective man day rose from \$19.03 in 1946 to \$22.79 in 1947. On the other hand the cost per acre for doing the ribes eradication work declined from \$16.11 in 1946 to \$15.45 in 1947, and productivity expressed in per acre accomplishments increased from 1.18 acres per man day in 1946 to 1.47 acres per man day in 1947. This is the first time since prices began soaring that higher operating efficiency has been able to overhaul rising costs. It is not a great cost reduction yet it indicates what might be done in lowering costs if operating expenses would level off or drop back to a more rational plane.

There are two factors responsible for this increase in production and lowered cost. First, better labor and better supervisors. Better labor stayed on the job longer and their work performance was of a higher quality than for any period since before the war. Second, two developments wholly in the experimental stages during 1946 were put into practical use in 1947; chemical eradication in areas where ribes are abundant, and the contracting of ribes eradication jobs in areas where ribes are light.

Chemical Eradication

On approximately 3 per cent of the sugar pine types of the region ribes occur so abundantly and attain such size they present special problems to eradication crews. Because of the abnormally high cost of ribes suppression often requiring from 5 to 10 man days per acre to treat, these areas have received special attention in an effort to find some method, other than hand grubbing, for working them. Often the best growing sites for sugar pine are the sites where ribes too grow most profuse and rapid.

The eradication of ribes by use of the chemical 2,4-D was tested in 1946 and showed such promise that in 1947 it was adopted as the method for treating all areas where ribes occur in concentrations of 250 or more plants per acre. Seven truck-mounted power spray units were used in 1947. Some 360,025 gallons of 2,4-D diluted at the ratio of 750 parts of chemical per million parts of water were sprayed on scattered small areas aggregating 1,554 acres where ribes averaged 1,735 plants per

TABLE 1

SUMMARY OF RIBES ERADICATION WORK IN THE
PACIFIC COAST REGION - 1947

Operating Agency	Expenditures	Acres Worked		Ribes Destroyed	8-Hour Man Days Expended	Costs	
		Initial Erad.	Reeradication			Per Acre	Per Man Day
U. S. Forest Service	823,728	14,415	38,192	5,047,404	36,100	\$15.66	\$22.82
National Park Service	354,538	3,092	10,718	1,670,513	14,720	25.67	24.08
O & C Rev. Lands Adm.	113,300	6,796	7,573	240,061	4,548	7.88	24.91
Bureau - Coop.	504,736	17,513	17,943	3,368,697	23,448	14.24	21.52
Totals	\$1,796,302	41,816	74,426	10,326,675	78,816	\$15.45	\$22.79

In computing costs only areas actually covered by eradication crews and from which ribes have been removed are shown in this table.

In reeradication work there is normally a percentage of the area sufficiently free of ribes as a result of previous work to require no additional eradication effort. As successive eradications are performed the proportion of "ribes free" acreage increases.

For 1947 the acreage inspected by checkers and ascertained to be free of ribes at the time of reeradication is as follows: Forest Service, 17,893; National Park Service, 1,920; O & C Administration, 19,001; Bureau-Cooperative, 5,493; total, 44,307.

This area, added to the area covered by eradication crews shown in the table above represents the total area on which protection work has been done. Costs if figured on the basis of total acres protected would be \$11.19 per acre.

TABLE 2

OWNERSHIP OF LANDS WORKED IN THE
PACIFIC COAST REGION - 1947

Operating Agency	Total Acres Worked	Breakdown of Area by Land Ownership			
		National Forest Lands	National Park Lands	O & C Revested Lands	State and Private Lands
U. S. Forest Service	52,607	37,538	-	35	15,034
National Park Service	13,810	-	13,810	-	-
O&C Rev. Lands Adm.	14,369	504	-	4,074	9,791
Bureau - Coop.	35,456	8,139	-	-	27,317
Totals	116,242	46,181	13,810	4,109	52,142

TABLE 3

ACCUMULATIVE SUMMARY OF RIBES ERADICATION IN THE
PACIFIC COAST REGION 1926-1947

Land Ownership	Acreage in Control Units	Acres Worked		Ribes Destroyed	8-Hour Man Days Expended
		Initial Erad.	Reeradication		
National Forest	1,092,911	409,823	291,387	96,402,866	477,283
National Park	287,327	102,277	42,730	22,626,741	165,504
O&C Rev. Lands Adm.	104,145	43,750	6,024	1,150,486	19,127
Total Federal	1,484,383	555,850	340,141	120,180,093	661,914
State and Private	1,014,900	497,888	248,269	75,156,246	417,511
Totals	2,499,283	1,053,738	588,410	195,336,339	1,079,425

acre. For such concentrations of plants one man was able to cover 0.9 acres per day. To have worked the area by hand grubbing one man could do little better than 0.1 acres per day. In 1947 the average accomplishment of hand grubbing crews for areas averaging 95 ribes per acre was 1.47 acres per man day. In effect, therefore, chemical eradication has reduced the ribes suppression problem on the most troublesome and expensive areas to the point where it is little greater than the normal suppression job. Refinements in techniques for applying 2,4-D are just beginning and greater savings can be expected in this field. For example, in 1948 the dosage of 2,4-D will be reduced from 750 to 500 ppm. Experiments with minute amounts of high concentrates applied under pressure from light hand spray units show promise of extending chemical eradication to areas of lower ribes populations than is practicable for the regular power spray units.

Contract Work

It has long been apparent that regularly employed hired laborers consume more time covering areas where ribes are few and scattered, than should be necessary. Often as much time is required to treat areas light in ribes as for areas where they are fairly abundant. Because of inability or disinclination hired crews do not get over the ground as rapidly as they should where the element of searching for ribes is an important factor.

Contract crews have an incentive to move swiftly. Moreover, and of more significance, regular hired crews on many occasions do not clean out ribes to required standards. If an area does not meet control standards the first working they plug over it again at the same rate of speed for the same pay. The situation is different with contract crews. They have an interest in doing a fast and clean job as their profits are dissipated when they must be called back to rework.

During 1947, a total of 6,258 acres were completed to prescribed specifications by 34 contractors at an average bid price of \$6.25 per acre.

On the Rogue River National Forest both contract work (62 per cent of the regional total) and work by regular hand crews, were done in comparable areas. Total contract costs averaged \$6.91 per acre, \$5.52 per acre bid plus \$1.39 per acre for checking and administration. For the regular labor the cost per acre was \$11.37. This saving of \$4.46 per acre indicates the possibilities inherent in the contract system when it can be utilized to its fullest potential and competition between contractors bend the cost further downward.

Spread of the Rust

Scouting for white pine blister rust in the region in 1947 revealed no long distance spread of the rust. There was little late spring precipitation and infection on ribes was noted only in the vicinity of sporulating cankers, and even there it was light. Mid-July rains in northern California and southern Oregon caused heavy rust intensification on ribes the rest of the season. This was particularly true on Ribes sanguineum, R. klamathense, and R. lobbi.

Although several new infection centers were located each was comparatively near a previously known center. However, these new finds show that the rust keeps intensifying on pines from year to year. The rust appears to be building up at a faster rate on the sugar pine growing between the Rubicon River and the Middle Fork of the American River on the Eldorado National Forest than it is on the Tahoe, Plumas, and Lassen Forests. It is intensifying at a much more rapid rate in the Siskiyou Mountains of the northwestern section of California and in parts of Oregon than has thus far been the case in the Sierra Nevadas of California.

With the finding of several new infection centers on pine on the Eldorado National Forest scouting was shifted to the Stanislaus and Sierra Forests to the south. No rust, either on ribes or on sugar pine, was found south of Pilot Creek on the Eldorado National Forest. This latter discovery extended the known location of infected pine eight miles farther south.

Pinyon rust was the lightest in the Sierra Nevada that it has been for years; however, it was picked up on ribes for what is believed to be the first time on both the Mendocine and Trinity National Forests.

Economic Study

As accelerated logging bites deeper into California's supply of old growth sugar pine stumpage, more and more thought is directed to the problem of the kind of forest management of both virgin timbered and cut-over lands needed to bring on an adequate supply of young pine. With attention centered on land management the economic side of the problem comes sharper into focus.

In 1947 members of Forest Service, the State Division of Forestry, and the lumber industry discussed the question of the economics of growing sugar pine under the handicap of blister rust as well as the silvicultural problem of how best to obtain and maintain satisfactory regrowth of sugar pine. The outgrowth of these discussions was a joint decision to launch a special study in these fields to see what answers might be found. As a preliminary step an advisory committee was formed to outline the general scope of the studies and to review periodically the progress being made. This committee is composed of one member each from the Forest Service Regional Office, the California Forest and Range Experiment Station, the Bureau of Entomology and Plant Quarantine, the State Division of Forestry, the California Forest Protective Association, and two members from lumber industry. Two meetings have been held and agreement has been reached as to the general outline of the studies to be undertaken. The work is being spearheaded by the economist and the silviculturist of the California Forest and Range Experiment Station, with the collaboration of others as needed. Work on both the economic study and the pine management study is now in progress.

PART II

LEADERSHIP, COORDINATION, AND TECHNICAL DIRECTION OF BLISTER RUST CONTROL BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Financial Project BLR-1-5

By

Roy Blomstrom, Forester

PURPOSE

During 1947 four operating Federal agencies performed control work in the region, each on lands within its jurisdiction. In addition, nine state and private agencies contributed financially and through facilities and services. Under the Lea Act of 1940 Congress has charged the Bureau of Entomology and Plant Quarantine with the responsibility of providing the leadership, technical direction, and the over-all planning necessary to coordinate the work of these cooperating agencies one with another and with the regional plan of control.

ORGANIZATION

Through its technical staff the regional headquarters* of the Bureau at Berkeley carried out the purpose of this project. Staff members were present on all active operations in an advisory capacity and they rendered assistance in the actual operation of the blister-rust-control program of each cooperating agency. Through members of the regional office, basic pathological information was secured and disseminated, complete and adequate records of accomplishments were maintained, and information on the spread of the rust was furnished to all cooperators.

Seasonal employees were quartered and subsisted in standard 50-man camps. The camp complement consisted of 1 camp superintendent, 2 foremen, 1 first cook, 1 second cook, and 40 to 45 crewleaders, laborers, and flunkies. Wage rates for Bureau and Forest Service employees were standardized on a per annum basis. A listing of the wage rates paid Bureau employees follows:

*In September 1947 the Bureau's regional office was moved from the Syndicate Building in Oakland to the Odd Fellows Building at 2288 Fulton Street, Berkeley.

Rates of Pay for Seasonal Employees

Classified

<u>Payroll Title</u>	<u>Field Title</u>	<u>Per Annum Rate</u>
Field Supervisor, SP-7	Camp Superintendent	\$ 3021.00
Field Supervisor, SP-6	Foreman	2644.00
Field Supervisor, SP-5	Assistant Foreman	2394.00
Field Supervisor, SP-5	Assistant to Operation Supervisor	2394.00
Inspector, SP-7	Checker Foreman	3021.00
Inspector, SP-6	Senior Checker	2644.80
Inspector, SP-5	Junior Checker	2394.00
Clerk, CAF-3	Camp Clerk	2168.28

Unclassified

<u>Payroll Title</u>	<u>Field Title</u>	<u>Per Annum Rate</u>
Cook, unallocated	Cook, first	\$ 2920.68
Cook, unallocated	Cook, second	2694.96
Cook, unallocated	Cook, small camp	2394.00
Laborer	Crewleader	2243.52
Laborer	Laborer or Flunky	2020.00
Laborer	Truck Driver, 2-ton	2318.76

ACCOMPLISHMENTS IN LEADERSHIP AND COORDINATION

The Bureau provided the necessary technical staff to plan, advise, inspect, and render assistance to the blister-rust-control programs of the following cooperative agencies, all of which participated in the 1947 activities.

1. Agencies engaged in control work:

- a. Bureau of Entomology and Plant Quarantine
- b. U. S. Forest Service
- c. National Park Service
- d. Oregon and California Revested Lands Administration

2. Agencies participating financially in the cooperative control program on state and private lands:

- a. State of California (Division of Forestry, Department of Natural Resources). Appropriations have been made since 1941. The appropriation for the fiscal year July 1, 1947 to June 30, 1948 is \$125,000.00.
- b. The Diamond Match Company has made a yearly appropriation of \$2,000.00 since 1942.
- c. The Michigan-California Lumber Company has contributed \$2,000.00 yearly since 1942.

- d. The Winton Lumber Company entered the program in 1946 with a contribution of \$1,000.00 and continued its participation with the same amount for the fiscal year 1948.
3. Agencies contributing facilities and services under Memoranda of Agreement with the Bureau of Entomology and Plant Quarantine:
 - a. State of California
 - (1) Department of Agriculture
 - (2) College of Agriculture, University of California
 - (3) Botanical Gardens, University of California
 - b. State of Oregon:
 - (1) Oregon State Board of Forestry
 - (2) Division of Plant Industry, Department of Agriculture

The State of California continued its participation with an appropriation of \$125,000 for work on state and private lands. This is an increase of \$50,000 over previous years. The appropriation carried the stipulation that any sums expended should be matched with Federal money. Working operations between the State of California and the Bureau of Entomology and Plant Quarantine are governed by the Memorandum of Agreement dated January 1942.

The Memoranda of Agreement with the Federal agencies, states, and privately owned lumber companies continued in effect during 1947.

The outstanding success of large scale field experiments with truck-mounted power spraying of the chemical 2,4-D on heavy ribes concentrations in 1946 made it advisable to adapt the method for general field use in 1947. The Bureau, as technical leader, provided a staff man for the necessary planning and technical direction to procure the equipment, accessories, and materials required to construct seven truck-mounted power spray units, and selected and trained the personnel needed to operate the units. These spray units and personnel were used by the Forest Service, National Park Service, and the Bureau for the application of 2,4-D ribicide as a supplementary method of ribes eradication.

In the field of public relations a motion picture on white pine blister rust was completed. The photography was done by the Motion Picture Service of the Office of Information, based on scenario prepared in collaboration with the Bureau.

Labor Recruitment

The recruitment of labor and temporary field supervisors for the cooperative project on state and private lands was a responsibility of the Bureau. Also, under an agreement with the U. S. Forest Service, this agency when requested furnished laborers for Forest Service camps on the Stanislaus and Eldorado National Forests and by agreement with the National Park Service laborers were furnished for all blister-rust-control camps in the national parks. As in previous years, labor was secured mainly through two sources of supply: (1) the California State Employment offices,

and (2) by applications taken at the regional office of the Bureau in Oakland. The former agency supplied about 350 men and the latter about 900. Recruitment was carried out on a nation-wide basis. Contacts were made with all forestry schools in the United States and with 77 major universities and colleges west of the Mississippi River. Approximately 3,500 applications were received and processed in the Oakland office, resulting in the employment of men from the following regions:

East of the Mississippi River	60 men
Midwest, including Rocky Mountain states	80 men
Southwestern states	60 men
Pacific Coast states	1,050 men

This year was the first in several that an adequate supply of adult labor was available for the project, and it became possible to eliminate the 16-year old boys entirely and all but a few experienced 17-year olds. Since the camps opened early in May before the end of the academic year, it was necessary to employ a large number of laborers of the transient type. These were supplied mainly by the California State Employment Service. With the exception of a nucleus of experienced personnel who return each season, they were poor workers. The turnover from this group was high, partly because of the poor physical condition of the men and partly because of their addiction to alcohol. After June 1 a large supply of college students and high school seniors became available and were assigned to the jobs during the remainder of the season. For the most part the younger men showed a welcome amount of stamina and ability to perform satisfactory work. However, since the school vacation period is so short, employment of students necessarily results in a higher cost of employment, occasioned by the fact that schools reopen about the time the workers have become thoroughly trained and most useful.

The need for competent temporary supervisors, checkers, clerks, and cooks remained one of the major problems during the entire season. The wage rate of 97¢ per hour for laborers and \$1.07 per hour for crewleaders was adequate to attract a sufficient number of men, but there was always a shortage of technical and supervisory personnel. The scarcity of the latter is largely due to the very short working season and low net earnings arising from the handicap of operating on a five-day week. Under these conditions competition with private industry becomes difficult to overcome.

Sugar Pine Economic Study

Early in 1947 preliminary action was taken on a proposed study of the economics of white pine blister rust control in the sugar pine types and management practices necessary to insure an adequate stand of reproduction after logging. An advisory committee was formed consisting of one member each from the Region 5 office, the California Forest and Range Experiment Station, Bureau of Entomology and Plant Quarantine, State Division of Forestry, and three representatives from private industry.

The basic study consists of two parts, (1) the economics of blister rust control in sugar pine types, and (2) silvicultural measures to be undertaken on lands to be protected from blister rust in order to grow the greatest volume of sugar pine, and the relationship of such silvicultural measures to the control of disease.

The California Forest and Range Experiment Station assigned Forest Economist H. J. Vaux to this economic study. By the end of 1947 Vaux had completed a preliminary report. Under the direction of Duncan Dunning, Silviculturist, preliminary work on the second phase of the project is underway and large scale field experiments will be undertaken early in the summer of 1948. Collaboration with the Bureau staff has been frequent.

ACCOMPLISHMENTS IN TECHNICAL DIRECTION

The Bureau in its role of supplying technical direction assigned a staff representative to each active operation. In addition the Bureau representative was responsible for checking, disease surveys, reconnaissance, scouting, and supplying other pertinent data.

With the limited amount of funds available, the short working season that is inherent when employing students, and accelerated logging activities which result in increased ribes regeneration, it became necessary to carefully select all areas needing eradication and to work only those of the highest priority. As far as possible, conducive with good administration, ribes eradication was confined to site A-200 and site I supporting a good stand of young second growth or a good residual stand of pine reproduction remaining on recently logged areas. Areas of high hazard rust incidence were given second priority. A limited amount of spot and stream type work was continued in new infection centers in an effort to prevent them from becoming epidemic.

The One-Man System of Ribes Eradication

The one-man system of eradication was employed experimentally on the Klamath-Oregon operation. Various modifications were tried but all were basically the same.

Work areas were prestrung in cardinal directions by string men using hand compasses and pacing. Lanes were laid so that the eradicator progressed downhill as much as possible, thus facilitating his search for ribes. Lanes were laid 2-1/2 chains apart and marked by small location tags every four chains. This partitioned the area into one-acre blocks. By numbering the lanes and location tags in the field and diagrammatically indicating the identical system on the checking maps, an indexed grid of the area was created.

Eradicators worked strips 2-1/2 chains long between the string lines. The worked area was marked either by a paper trail or by a colored drag line.

A record of the number of ribes pulled was kept by species for each individual one-acre block.

Some of the advantages of the one-man system are:

- (1) Responsibility for an area can be definitely tied to one man.
- (2) Eradicators are not forced to adjust their rate of progress to that of another.
- (3) Ribes populations by species by the acre can be accurately shown.

- (4) Spot work and/or rework can be completed faster, held to a minimum area, and more easily delineated by the use of the coordinated field-check map grid.
- (5) Graphic progress records can be more easily and accurately shown and maintained for each individual eradicator.
- (6) The system worked particularly well with inmate eradicators.

Some of the disadvantages of the one-man system are:

- (1) The antipathy of some men against working alone in the woods.
- (2) Modifications necessary in the established method of checking.
- (3) The additional physical strain imposed on the eradicators by the drag lines. Minor difficulty was experienced with the drag lines kinking, catching, and becoming dirty and difficult to see. Experiments are continuing with a plastic coated drag line.

Contract Ribes Eradication

Contracting ribes eradication work, begun on an experimental basis in Oregon in 1946, was continued during the 1947 season. The Forest Service awarded contracts on the Rogue River Forest R-6 and on the Klamath and Plumas Forests in R-5. The Bureau of Land Management (Oregon and California Revested Lands Administration) likewise conducted ribes eradication through contract work. Both agencies awarded thirty-four separate contracts through competitive bidding. In all, 6,258 acres were completed to prescribed specifications by contractors at an average bid price of \$6.25 per acre.

Contracts averaged about 185 acres each. They were purposely restricted in order to keep them within the capabilities of the average conscientious laborer or group of laborers. Also small contracts enabled better control and created more competition. If a contractor failed to fulfill contracted obligations he was eliminated from future bidding and his failure did small harm to the control program as a whole.

Of the 6,258 acres of contract work done in the Pacific Coast Region, 62 per cent of it was on the Rogue River National Forest in Oregon. Since both this type of eradication and that by hired day labor was carried on in that forest, results there provide the best basis for comparative costs. Total contract costs averaged \$6.91 per acre (\$5.52 average bid price per acre and \$1.39 per acre for checking, administration, etc.) Acres covered by two 30-man camps of hired day laborers totaled 4,985. Expenditures chargeable to camp operation were \$56,698.82. Therefore, per acre costs by hired laborers amounted to \$11.37. Not only was the contract work cheaper but it was also of better quality. Comparable regular checks revealed that an average of one bush and 1.5 feet of live stem remained per acre on contracted areas, whereas an average of 2.3 bushes and 6.1 feet of live stem per acre remained on areas worked by hired labor.

Contracting shows definite promise of becoming a valuable supplementary method of obtaining control. This is particularly true on areas supporting light ribes populations where searching takes up most of the eradicators' time, and laborers with physical stamina and considerable knowledge of ribes habits of growth are essential if the job is to be done effectively. Existing salary scales and policies make it most difficult to hire labor

with these qualifications. As a result more time and money is spent in trying to eradicate ribes to the standards of cleanliness required for effective control than would be necessary with the right type of labor at higher wages. Contracting, through the possibilities of greater earnings, provides a means of attracting men with the qualifications needed at reasonable per acre costs. Competitive bidding should result in bid prices being reduced somewhat as the contract program gains momentum.

A summary of the 1947 contract work will be found on page 29 of this report.

Chemical Ribes Eradication

Chemical eradication of heavy concentrations of ribes with truck-mounted power spray units applying the chemical 2,4-D passed from a developmental stage in 1946 to a practical field use basis in 1947. Under the direction of a Bureau technician seven truck-mounted power spray units were placed in operation during 1947. Of these units, four belong to the Forest Service, one to the National Park Service, and two to the Bureau. In addition, the Bureau utilized two small semi-portable units adapted from Army surplus insecticide sprayers of the Dobbins 4 GPM type. These small units proved of value in the treatment of roadside and spot concentrations too small in area for practical treatment with the large rig.

In developing practical crew methods for the use of 2,4-D sprays it was necessary for the Bureau to conduct a training school for key personnel for the Forest Service and Park Service as well as for permanent Bureau personnel. This school was held at the Soda Springs blister-rust-control camp on the Lassen operation during the second week in April. Fundamental methods of laying out areas for treatment, crew organization, and other items peculiar to the spray job were emphasized, including methods of application for an effective kill, types of nozzle, etc., all of which were based on the Bureau's experience with power spraying during its 1946 experimental work. (Reference part IX, section 1, of the 1946 annual report.) In addition, prior to the start of any spray work, a Bureau staff technician traveled to each operation and gave detailed on-the-job organization and training of all spray crews. During the season this representative visited, inspected, and offered suggestions for improvement in methods on the various operations.

Accomplishments of the power spray project during the 1947 field season are summarized in table 4, part II of this report. The performance of all equipment used was outstanding, meeting all the requirements of durability, portability, and suitability. Checking of the 1946 spray work revealed that effective killing with 2,4-D ribicide drops off rapidly toward the end of the active growing season for ribes plants. In the Sierras this active growing season is of fairly short duration, terminating generally about the middle of July for old bushes. Although seedlings and young bushes up to four years old can be killed effectively throughout July and early August it was decided to stop spraying operations about the second week in July. Prior to terminating spray operations this year some of the spray crews worked on a double shift in order to take fullest advantage of the active growth period. Next year an early start and a double shift program for most of the units will in effect "prolong" the spraying season. After spray operations cease, the power units will

again, as in 1947, be made available to the fire suppression organization as standby equipment to combat forest fires. In this latter role the equipment, as developed, more than proved its effectiveness this year in extinguishing fire with a minimum amount of water.

Three proprietary 2,4-D compounds were used during the 1947 season. The Northern Sierra operation used Du Pont "Weed Killer", an ammonium salt with 77.5 per cent by weight acid equivalent. The Central Sierra operation used "Chipman 2,4-D", a sodium salt with 60 per cent by weight acid equivalent. The Southern Sierra operation used "Stantox 40", a Standard Agricultural Chemical Company triethanolamine salt with 43.5 per cent by weight acid equivalent. Dilutions were made to give 750 ppm acid equivalent in the final spray solution; this was the standard recommended dosage. Marking and wetting agents were standardized for all operations. Titanox B-30 (containing 30 per cent titanium dioxide and 70 per cent barium sulfate) was used as a marking agent at the rate of 1-1/2 pounds per 100 gallons. Tergitol #7, at the rate of one fluid ounce per 100 gallons, was used as the wetting agent. On the basis of inventory records costs for the above materials per gallon of spray solution during 1947 were as follows:

North Sierra	-	\$0.0154 per gallon
Central Sierra	-	0.0218 per gallon
South Sierra	-	0.0177 per gallon

The cost of power equipment and accessories will have to be prorated between the project and fire suppression to derive an equitable accounting.

In decapitation work 2,4-D was used in place of a previously established application of salt and Borax because it is effective in much smaller doses and is cheaper than salt and Borax. Experimental tests during 1946 and 1947 show that this method is applicable to all ribes species for which 2,4-D is effective. For decapitation, which is a method confined to troublesome rock-bound and log-covered ribes, liquid concentrates of 2,4-D ester in oil or triethanolamine aqueous concentration (5 per cent by weight or more) are used. (For full details see part IX of this report.)

Checking

Arrangements with cooperating agencies authorizing the Bureau to handle checking continued in effect. All checking work is the responsibility of the Bureau and is conducted under the direction of the Bureau checking supervisors. All checkers are employed by the Bureau and reimbursement is claimed from other agencies for the salaries of checkers assigned to their project. Throughout the region the Bureau employed 102 checkers. Of these 75 were in California and the remaining 27 were in Oregon. A total of 3,485.5 man days were spent covering 289,607 acres. This includes 97,826 acres regular, 70,935 advance, and 120,846 post check.

With the exception of one 4-man advance check party on the Tahoe the remaining checkers were quartered and subsisted at the regular eradication camps.

Reconnaissance

The selection of sugar pine stands to be protected and their arrangement in a priority order is an important step in any blister-rust-control program. Reconnaissance aids in this selection. During the summer the Bureau employed and supervised the work of four 6-man reconnaissance parties. The parties were located one each on the Rogue, Lassen, and Plumas National Forests and the fourth party divided its time on the Tahoe, Eldorado, and Stanislaus National Forests. The parties started between May 19 and June 23 and continued to operate until September 1 to 15. A total of 201,870 acres of timber-bearing area was covered.

Disease Survey

Two disease survey parties were operated. The first, a 6-man party, opened June 2 on the Rogue River National Forest. The party was doubled in size the latter part of July and moved to the Siskiyou Forest where they continued to operate until disbanded on August 12. The second party, consisting of four men, started work June 23 and continued to operate until early September. It operated about equal time on the Umpqua (R-6), and the Klamath and Eldorado National Forests (R-5). During the season approximately 50,000 trees bearing 7,900 cankers, were treated on 39,000 acres.

Scouting

Scouting was conducted in the late summer and early fall by a 2-man Bureau party and by Forest Service staff men and Bureau technicians. No new significant finds were reported.

A full report of reconnaissance, checking, disease survey, and scouting appears elsewhere in this report.

FINANCIAL STATEMENTS

The 1947 calendar year control program was carried on in the Pacific Coast Region from regular Congressional appropriations to the Bureau and cooperating Federal agencies together with the State of California and private cooperators' cash contributions.

In financial table 1 are shown the allotments made to the cooperating Federal agencies for expenditure in the Pacific Coast Region for the 1947 and 1948 fiscal years. Financial table 2 shows the expenditures by the same agencies for the 1947 calendar year.

Financial table 3 pertains only to expenditures of this Bureau and shows expenditures by project and appropriation symbol, and by state separated to show amounts expended for salaries and wages, and for other expenses. The amounts shown as salaries are the net payments after deductions for subsistence from the earnings of the employees. The cost of subsistence supplies is included under "Expenses". Also included as a part of this table are the expenditures of the Developmental and Investigative Unit headquartered at Berkeley, whose bookkeeping records are maintained and vouchers processed through the Berkeley Regional Office. The expenditures of the Berkeley Unit include the salaries, expenses, and operating costs

of three of its personnel headquartered at the Northwestern Regional Office at Spokane, Washington and one stationed at Moscow, Idaho.

Financial table 4 (also shown as table 9, page 65) shows the amounts contributed in cash by the State of California and the four cooperating lumber companies for ribes eradication in California and the amounts allocated by the Federal Government for the purpose of matching such contributions under the provisions of the "Lea Act", Public Law 486, 76th Congress. This table also shows the accumulative expenditures from "Lea Act" funds from July 1, 1941 through December 31, 1946; such expenditures during the period January 1 to December 31, 1947, and the balances available for expenditure as of January 1, 1948. The available Federal funds must be expended prior to July 1, 1948; the cash contributions from State and private sources remain available until expended.

Omnibus table 4 presents a summary of expenditures for 1947.

TABLE 1

FISCAL YEAR ALLOTMENTS FROM WHICH FEDERAL EXPENDITURES WERE MADE
IN THE PACIFIC COAST REGION DURING THE CALENDAR YEAR 1947

ALL REGULAR FUNDS

<u>Agency</u>	<u>Fiscal Year 1947</u>	<u>Fiscal Year 1948*</u>
Bureau of Entomology and Plant Quarantine\$ 700,022	\$ 254,000
Forest Service, Region 5 (California).	696,000	650,000
Forest Service, Region 6 (Oregon).	124,558	100,000
National Park Service:		
Yosemite National Park	206,500	150,000
Sequoia-Kings Canyon National Parks.	89,500	80,000
Regional Office.	18,018.	25,000
Oregon and California Revested Lands Administration	<u>151,700</u>	<u>93,000</u>
Total - Pacific Coast Region	\$ 1,986,298	\$ 1,352,000

*Figures in this column represent allotments as they are known as of
December 31, 1947, and are subject to change until June 30, 1948.

TABLE 2

FEDERAL EXPENDITURES IN THE PACIFIC COAST REGION FOR THE CALENDAR YEAR 1947

REGULAR FUNDS

Agency	California		Oregon		Region
	Fiscal Year 1947 1/1/47-6/30/47	Fiscal Year 1948 7/1/47-12/31/47	Fiscal Year 1947 1/1/47-6/30/47	Fiscal Year 1948 7/1/47-12/31/47	
Bureau of Entomology and Plant Quarantine	\$ 318,317	\$ 163,247	\$ 4,891	\$ 4,822	\$ 491,277
Forest Service, Region V	291,146	389,663	-	-	680,809
Forest Service, Region VI	-	-	60,200	82,719	142,919
National Park Service:					
Yosemite National Park	97,100	113,749	-	-	210,849
Sequoia-Kings Canyon National Park	53,902	63,201	-	-	117,103
Regional Office	12,239	14,347	-	-	26,586
Oregon and California Revested Lands Administration	-	-	58,044	55,256	113,300
Total - Pacific Coast Region	\$ 772,704	\$ 744,207	\$ 123,135	\$ 142,797	\$ 1,782,843

TABLE 3

CLASSIFIED BUREAU EXPENDITURES BY STATE, APPROPRIATION SYMBOL, AND PROJECT
PACIFIC COAST REGION - JANUARY 1 TO DECEMBER 31, 1947

Appropriation Symbol Project No.	Fiscal Year 1947 1272245(66).003		Fiscal Year 1948 1282245(66).003		12X8200(13).213*				Total
	3101.14	3103.14	3101.14	3103.14	X2132.14	X2133.14	X2134.14	X2136.14	
California									
Salaries	\$53,367.73	\$115,451.10	\$42,026.33	\$78,562.65	\$92,631.33	-	-	-	\$382,039.14
Expenses	13,332.84	136,165.86	11,948.49	30,709.46	48,053.83	\$3,161.93	-	-	243,372.41
Totals	\$66,700.57	\$251,616.96	\$53,974.82	\$109,272.11	\$140,685.16	\$3,161.93	-	-	\$625,411.55
Oregon									
Salaries	\$4,560.50	-	\$4,628.60	-	-	-	-	-	\$9,189.10
Expenses	330.23	-	193.48	-	-	-	-	-	523.71
Totals	\$4,890.73	-	\$4,822.08	-	-	-	-	-	\$9,712.81
Pacific Coast Region									
Salaries	\$57,928.23	\$115,451.10	\$46,654.93	\$78,562.65	\$92,631.33	-	-	-	\$391,228.24
Expenses	13,663.07	136,165.86	12,141.97	30,709.46	48,053.83	\$3,161.93	-	-	243,896.12
Totals	\$71,591.30	\$251,616.96	\$58,796.90	\$109,272.11	\$140,685.16	\$3,161.93	-	-	\$635,124.36
*Contributed cooperative funds; X2132.14 State of California, Division of Forestry, \$125,000; X2133.14 The Diamond Match Company \$2,000; X2134.14 Michigan-California Lumber Company \$2,000; X2136.14 The Winton Lumber Company \$1,000.									
D & I Unit**									
Salaries	\$14,819.13	-	\$15,156.26	-	-	-	-	-	\$29,975.39
Expenses	3,165.73	-	674.68	-	-	-	-	-	3,840.41
Totals	\$17,984.86	-	\$15,830.94	-	-	-	-	-	\$33,815.80

D & I Unit**

Salaries	\$14,819.13	-	\$15,156.26	-	-	-	-	\$29,975.39
Expenses	3,165.73	-	674.68	-	-	-	-	3,840.41
Totals	\$17,984.86	-	\$15,830.94	-	-	-	-	\$33,815.80

**Amounts shown in these columns represent expenditures of the Development and Investigative Unit also headquartered at Berkeley from funds allocated directly to that Unit, but whose accounts and vouchers were processed by the Pacific Coast Regional Office.

TABLE 4

STATUS OF COOPERATIVE FUNDS FOR RIBES ERADICATION ON STATE AND PRIVATE LANDS
IN CALIFORNIA - JULY 1, 1941 TO DECEMBER 31, 1947

Cooperative Funds	Accumulative Cooperative Contributions and Federal Appropriations 7/1/41-6/30/48	Accumulative Expenditures 7/1/41-12/31/46	Expenditures Calendar Year 1947	Available Balances as of 1/1/48
State and Private Cash Contributions:				
State of California	\$ 425,000	\$ 224,313	\$ 140,685	\$ 59,996
Diamond Match Company	12,000	8,232	3,162	606
Michigan-California Lumber Company	12,000	7,946	-	4,054
Red River Lumber Company*	4,000	4,000	-	-
Winton Lumber Company	3,000	1,000	-	2,000
Total	\$ 456,000	\$ 245,497	\$ 143,847	\$ 66,656
Federal Allotments (Project 3103.14)				
1942 Fiscal Year	\$ 14,625	\$ 14,612	-	-
1943 Fiscal Year	71,770	71,378	-	-
1944 Fiscal Year	86,195	86,083	-	-
1945 Fiscal Year	85,040	84,997	-	-
1946 Fiscal Year	271,125	270,514	-	-
1947 Fiscal Year	563,000	309,866	251,617	-
1948 Fiscal Year	130,000	-	109,272	\$ 20,728
Total (Project 3103.14)	\$ 1,221,755	\$ 837,480	\$ 360,889	\$ 20,728
Grand Total	\$ 1,677,755	\$ 1,082,977	\$ 504,736	\$ 87,384

*Red River Lumber Company contributed only for 1943 and 1944 fiscal years.

NOTE: Expenditures in the amount of \$44,015.21 were made during 1947 for emergency fire suppression at the call of the State of California, Division of Forestry, and the U. S. Forest Service. Reimbursements were made by these agencies to the Bureau blister-rust-control funds in the amount of \$10,861.12 from the State of California and \$33,154.09 from the Forest Service. These amounts were credited back to the funds from which expended and are a part of the balances shown available for expenditure.

TABLE 5
(Omnibus Table 4, Sheets 1 and 2)

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1947

State	Cooperative Funds			Total Federal Funds	Total All Funds	Federal Funds				O & C
	Total (Direct and Indirect Aid)	Indirect Aid	Direct Aid			Entomology and Plant Quarantine		Forest Service	Park Service	
						3101	3103			
California	\$151,047	\$7,200	\$143,847	\$1,516,911	\$1,667,958	\$120,675	\$360,889	\$680,809	\$354,538	-
Oregon	1,000	1,000	-	265,932	266,932	9,713	-	142,919	-	\$113,300
Totals	\$152,047	\$8,200	\$143,847	\$1,782,843	\$1,934,890	\$130,388	\$360,889	\$823,728	\$354,538	\$113,300

State	Cooperative Funds Direct Aid			Expenditures* Chargeable to Ribes Eradication	Average Cost	
	State	Private	Total		Per Acre	Per Effective Man Day
California	\$140,685	\$3,162	\$143,847	\$1,540,083	\$17.36	\$22.62
Oregon	-	-	-	256,219	9.31	23.85
Totals	\$140,685	\$3,162	\$143,847	\$1,796,302	\$15.45	\$22.79

*Includes only Bureau 3103, Cooperative Direct Aid, all other Federal Agency expenditures listed in table above.



REGIONAL SUMMARY TABLES
OF
RIBES ERADICATION AND OF CHECKING



TABLE 1
THE STATUS OF RIBES ERADICATION IN THE PACIFIC COAST REGION AS OF DECEMBER 31, 1947
PART A - CALIFORNIA

Control Operation	Class of Ownership	Control Units		Status of Ribes Eradication									
		Total Acres	Acres Unworked	First Working			Reeradication			Total All Workings			
				Acres Worked	Man Days	Ribes Eradicated	Acres Worked	Man Days	Ribes Eradicated	Acres Worked	Man Days	Ribes Eradicated	
National Forests													
Mendocino	Federal	21,017	21,017										
	Private	15,179	15,179										
	State	48	48										
	Total -	36,244	36,244										
Trinity	Federal	122,575	122,575										
	Private	40,283	40,283										
	State	2,088	2,088										
	Total -	164,946	164,946										
Klamath	Federal	19,650	10,998	8,652	9,041	1,069,859	3,835	4,026	185,947	12,487	13,067	1,255,816	
	Private	26,850	5,457	21,393	21,810	1,804,943	6,891	6,018	145,409	28,284	27,828	1,950,352	
	Total -	46,500	16,455	30,045	30,851	2,874,812	10,726	10,044	331,356	40,771	40,895	3,206,168	
Shasta	Federal	3,611	3,611										
	Private	74,151	74,151										
	Total -	77,762	77,762										
Lassen	Federal	69,172	55,120	14,052	8,530	1,624,930	5,212	2,532	292,829	19,264	1,162	1,917,753	
	Private	243,921	185,725	58,196	39,423	5,403,552	24,866	9,756	1,137,375	83,062	49,179	6,540,927	
	State	1,055	1,055										
	Total -	314,148	241,900	72,248	48,053	7,028,482	30,078	12,288	1,430,204	102,326	60,341	8,458,686	
Plumas	Federal	186,585	96,700	89,885	69,379	13,020,391	55,938	33,757	3,528,671	145,823	103,136	16,549,062	
	Private	125,630	45,793	79,837	66,934	13,559,925	54,841	30,901	4,003,680	134,678	97,835	17,563,605	
	State	360	320	40	21	4,620				40	21	4,620	
	Total -	312,575	142,813	169,762	136,334	26,584,936	110,779	64,668	7,532,351	280,541	200,992	34,117,287	
Tahoe	Federal	19,925	19,925										
	Private	19,983	19,983										
	Total -	39,908	39,908										
El Dorado	Federal	117,725	45,145	72,580	38,914	10,752,805	45,010	26,951	2,091,687	117,590	65,865	12,844,492	
	Private	126,507	31,756	94,751	61,309	14,541,053	59,140	32,452	2,973,863	153,891	93,761	17,514,916	
	State	2,642	40	2,602	1,634	310,891	1,103	383	18,706	3,705	2,017	329,597	
	Total -	246,874	76,941	169,933	101,857	25,604,749	105,253	59,786	5,084,256	275,186	161,643	30,689,005	
Stanislaus	Federal	106,691	26,458	80,233	35,720	9,195,664	87,366	42,241	7,762,205	167,599	77,961	16,957,869	
	Private	122,526	16,465	106,061	52,640	17,612,411	68,799	36,238	4,124,315	174,860	88,878	21,736,726	
	State	407	407	129	129	16,768				407	129	16,768	
	Total -	229,624	42,923	186,701	88,489	26,824,843	156,165	78,479	11,886,520	342,866	166,968	38,711,363	
Sierra	Federal	173,391	125,618	47,773	89,888	18,912,807	45,496	36,375	10,533,410	93,269	126,263	29,446,217	
	Private	49,082	32,926	16,156	24,382	5,708,223	11,107	7,353	1,253,369	27,263	31,735	6,961,592	
	State	40	40										
	Total -	222,513	158,584	63,929	114,270	24,621,030	56,603	43,728	11,786,779	120,532	157,998	36,407,809	
Sequoia	Federal	43,930	43,930										
	Private	18,880	18,880										
	Total -	62,810	62,810										
TOTAL ALL NATIONAL FORESTS	Federal	884,272	571,097	313,175	251,572	54,576,466	242,857	145,882	24,394,749	556,032	397,454	78,971,215	
	Private	862,992	486,598	376,394	266,498	58,630,107	225,644	122,718	13,638,311	602,038	389,216	72,268,118	
	State	6,640	3,591	3,049	1,784	332,279	1,103	383	18,706	4,152	2,167	350,985	
	Total -	1,753,904	1,058,194	692,618	519,854	113,538,852	469,604	268,983	38,051,466	1,162,222	788,837	151,590,318	
National Parks													
Lassen Volcanic	Federal	17,425		17,425	5,679	756,696	3,040	1,561	123,705	20,465	7,240	880,401	
	Private	140		140	55	14,977	15	6	738	155	61	15,715	
	Total -	17,565		17,565	5,734	771,673	3,055	1,567	124,443	20,620	7,301	896,116	
Yosemite	Federal	143,790	82,395	61,395	93,457	13,500,286	30,238	35,497	4,333,114	91,633	128,954	17,833,400	
	Private	2,510	2,510										
	Total -	146,300	84,905	61,395	93,457	13,500,286	30,238	35,497	4,333,114	91,633	128,954	17,833,400	
Kings Canyon	Federal	22,430	16,490	5,940	9,329	1,497,098	3,840	2,824	328,600	9,780	12,153	1,825,698	
Sequoia	Federal	99,900	86,015	13,885	14,707	1,809,967	5,262	1,957	133,683	19,147	16,664	1,943,650	
TOTAL ALL NATIONAL PARKS	Federal	283,545	134,900	98,645	123,172	17,564,047	42,380	41,839	4,919,102	141,025	165,011	22,483,149	
	Private	2,650	2,510	140	55	14,977	15	6	738	155	61	15,715	
	Total -	286,195	137,410	98,785	123,227	17,579,024	42,395	41,845	4,919,840	141,180	165,072	22,498,864	
State Forests and Parks													
Latour Forest	Private	1,200	246	954	238	11,503				954	238	11,503	
	State	1,160	316	844	429	14,864				844	429	14,864	
	Total -	2,360	562	1,798	667	26,367				1,798	667	26,367	
Calaveras Big Trees Park	Private	120		120	21	3,260		75	20	722	195	3,982	
	State	1,973	225	1,748	1,318	185,001	1,265	472	26,595	3,013	1,790	211,596	
	Total -	2,093	225	1,868	1,339	188,261	1,340	492	27,317	3,208	1,831	215,578	
TOTAL ALL STATE FORESTS AND PARKS	Private	1,320	246	1,074	259	14,763		75	20	722	1,149	279	15,485
	State	3,133	541	2,592	1,747	199,895	1,265	472	26,595	3,857	2,219	226,460	
	Total -	4,453	787	3,666	2,006	214,628	1,340	492	27,317	5,006	2,498	241,945	
Totals for California													
TOTAL ALL CONTROL OPERATIONS CALIFORNIA	Federal	884,272	571,097	313,175	251,572	54,576,466	242,857	145,882	24,394,749	556,032	397,454	78,971,215	
	National Park	283,545	134,900	98,645	123,172	17,564,047	42,380	41,839	4,919,102	141,025	165,011	22,483,149	
	Total -	1,167,817	705,997	411,820	374,744	72,140,513	285,237	187,721	29,313,851	697,057	562,465	101,454,364	
	Private	866,962	489,354	377,808	266,812	58,659,847	225,734	122,744	13,639,421	603,342	389,556	72,299,318	
	State	9,773	4,132	5,641	3,531	532,144	2,368	855	45,301	8,009	4,386	577,445	
	Total -	2,044,552	1,249,483	795,069	645,087	131,332,504	513,339	311,320	42,998,623	1,308,408	956,407	174,331,127	



TABLE 1 (Continued)

THE STATUS OF RIBES ERADICATION IN THE PACIFIC COAST REGION AS OF DECEMBER 31, 1947

PART B - OREGON

Control Operation	Class of Ownership	Control Units		Status of Ribes Eradication								
		Total Acres	Acres Unworked	First Working			Reeradication			Total All Workings		
				Acres Worked	Man Days	Ribes Eradicated	Acres Worked	Man Days	Ribes Eradicated	Acres Worked	Man Days	Ribes Eradicated
National Forests												
Klamath	National Forest	9,031	4,142	4,889	7,211	559,628	1,934	1,489	22,558	6,823	8,700	582,186
	O & C	4,573	3,643	930	1,574	173,428	139	250	14,300	1,069	1,824	187,728
	Total -	13,604	7,785	5,819	8,785	733,056	2,073	1,739	36,858	7,892	10,524	769,914
	Private	1,552	723	829	1,882	113,810	377	329	3,244	1,206	2,211	117,054
	Total -	15,156	8,508	6,648	10,667	846,866	2,450	2,068	40,102	9,098	12,735	886,968
Rogue River	National Forest	87,491	21,422	66,069	39,713	14,628,690	44,220	18,527	1,494,439	110,289	58,240	16,123,129
	O & C	17,350	9,612	7,738	3,511	381,721				7,738	3,511	381,721
	Total -	104,841	31,034	73,807	43,224	15,010,411	44,220	18,527	1,494,439	118,027	61,751	16,504,850
	Private	79,010	5,885	73,125	8,846	1,225,069	14,089	2,685	227,167	87,214	11,531	1,452,236
	Total -	183,851	36,919	146,932	52,070	16,235,480	58,309	21,212	1,721,606	205,241	73,282	17,957,086
Siskiyou	National Forest	51,024	28,396	22,688	9,140	474,104	2,164	2,220	80,187	24,852	11,360	554,291
	O & C	75,896	40,924	34,972	9,511	505,536	5,885	4,119	70,039	40,857	17,630	575,575
	Total -	126,920	69,320	57,660	18,651	979,640	8,049	6,339	150,226	65,709	28,990	1,129,866
	Private	47,705	8,130	39,515	6,635	546,197	5,701	2,686	147,772	45,216	9,321	693,969
	Total -	174,625	77,450	97,175	25,286	1,525,837	13,750	9,025	297,998	111,225	38,311	1,823,835
Umpqua	National Forest	60,353	58,031	2,322	928	17,344				2,322	928	17,344
	O & C	6,158	6,158									
	Total -	66,511	64,189	2,322	928	17,344				2,322	928	17,344
	Private	8,266	8,266									
	Total -	74,777	72,455	2,322	928	17,344				2,322	928	17,344
TOTAL ALL NATIONAL FORESTS	National Forest	207,959	111,991	95,968	56,992	15,679,766	48,318	22,236	1,597,184	144,286	79,228	17,276,950
	O & C	103,977	60,337	43,940	14,596	1,060,585	6,024	4,369	84,339	49,664	18,965	1,145,024
	Total -	311,936	172,328	139,908	71,588	16,740,351	54,342	26,605	1,681,523	193,950	98,193	18,421,974
	Private	136,533	23,064	113,469	17,363	1,885,076	20,167	5,700	378,163	133,636	23,063	2,263,259
	Total -	448,469	195,392	253,377	88,951	18,625,427	74,509	32,305	2,059,706	327,586	121,256	20,685,233
National Parks												
Crater Lake	Federal	3,782	150	3,632	412	130,162	350	81	13,430	3,982	493	143,592
Nursery Sanitation												
McDonald State Forest (Clark-McHary Nursery)	Private	418		418	178	2,547				418	178	2,547
	State	462	50	412	174	2,472				412	174	2,472
	Total -	880	50	830	352	5,019				830	352	5,019
O & C (McKinley Nursery)	O & C	168	56	110	162	5,462				110	162	5,462
	Private	132	92	40	111	2,877				40	111	2,877
	Total -	300	150	150	273	8,339				150	273	8,339
TOTAL ALL NURSERIES	O & C	168	56	110	162	5,462				110	162	5,462
	Private	450	92	458	289	5,424				458	289	5,424
	Total -	618	148	568	451	10,886				568	451	10,886
Mt. Hebo White Pine Plantation												
Simulaw National Forest	National Forest	680		680	373	124,744	212	228	29,957	892	601	154,701
Totals for Oregon												
TOTAL ALL CONTROL OPERATIONS OREGON	National Forest	208,639	111,991	96,648	57,365	15,804,510	48,530	22,464	1,627,141	145,178	79,829	17,431,651
	National Parks	3,782	150	3,632	412	130,162	350	81	13,430	3,982	493	143,592
	O & C	104,145	60,395	43,750	14,758	1,066,147	6,024	4,369	84,339	49,774	19,127	1,150,486
	Total -	316,566	172,536	144,030	72,535	17,000,819	54,904	26,914	1,724,910	198,934	99,449	18,725,729
	Private	137,083	23,156	113,927	17,652	1,890,500	20,167	5,700	378,163	134,094	23,352	2,266,683
PART C - TOTALS FOR THE PACIFIC COAST REGION												
CALIFORNIA AND OREGON	National Forest	1,092,911	683,088	409,823	308,937	70,380,976	291,387	168,346	26,021,890	701,210	477,283	96,402,866
	National Parks	267,327	185,050	102,277	123,584	17,694,209	42,730	41,920	4,932,532	145,007	165,504	22,626,741
	O & C	104,145	60,395	43,750	14,758	1,066,147	6,024	4,369	84,339	49,774	19,127	1,150,486
	Total -	1,464,383	928,533	555,850	447,279	89,141,332	340,141	214,635	31,038,761	895,991	661,914	120,180,093
	Private	1,008,084	512,510	491,535	284,464	60,550,347	245,901	128,444	14,017,654	737,436	412,908	74,568,001

TABLE 2

SUMMARY OF RIBES ERADICATION IN THE PACIFIC COAST REGION - 1947

Operation	Class of Work	Acres Worked	8-Hour Man Days	Ribes Eradicated
California				
Klamath National Forest	Initial	2,785	2,738	224,946
	Reeradication	537	443	40,273
	Totals	3,322	3,181	265,219
Lassen National Forest	Initial	10,208	6,232	556,872
	Reeradication	5,278	2,587	328,172
	Totals	15,486	8,819	885,044
Plumas National Forest	Initial	6,335	8,439	1,647,937
	Reeradication	15,106	8,210	962,934
	Totals	21,441	16,649	2,610,871
Eldorado National Forest	Initial	5,829	5,586	1,181,818
	Reeradication	9,145	5,072	500,990
	Totals	14,974	10,658	1,682,808
Stanislaus National Forest	Initial	1,583	1,486	761,639
	Reeradication	9,343	5,785	838,357
	Totals	10,926	7,271	1,599,996
Sierra National Forest	Initial	1,068	1,719	779,751
	Reeradication	6,338	4,473	375,355
	Totals	7,406	6,192	1,155,106
NATIONAL FOREST TOTALS	Initial	27,808	26,200	5,152,963
	Reeradication	45,747	26,570	3,046,081
	Totals	73,555	52,770	8,199,044
Latour State Forest	Initial	1,360	584	17,929
Yosemite National Park	Initial	949	2,114	258,061
	Reeradication	7,058	7,850	746,300
	Totals	8,007	9,964	1,004,361
Kings Canyon National Park	Initial	673	1,664	317,506
	Reeradication	585	653	100,724
	Totals	1,258	2,317	418,230
Sequoia National Park	Initial	1,470	1,188	150,237
	Reeradication	3,075	1,251	97,685
	Totals	4,545	2,439	247,922
NATIONAL PARK TOTALS	Initial	3,092	4,966	725,804
	Reeradication	10,718	9,754	944,709
	Totals	13,810	14,720	1,670,513
CALIFORNIA TOTALS	Initial	32,260	31,746	5,896,696
	Reeradication	56,465	36,324	3,990,790
	Totals	88,725	68,074	9,887,486
Oregon				
Umpqua National Forest	Initial	2,322	928	17,344
Rogue River National Forest	Initial	164	106	4,424
	Reeradication	8,702	2,817	135,811
	Totals	8,866	2,923	140,235
Siskiyou National Forest	Initial	6,796	985	42,901
	Reeradication	8,004	3,739	200,915
	Totals	14,800	4,724	243,816
Klamath National Forest	Initial	274	893	23,075
	Reeradication	1,255	1,274	14,719
	Totals	1,529	2,167	37,794
OREGON TOTALS	Initial	9,556	2,912	87,744
	Reeradication	17,961	7,830	351,445
	Totals	27,517	10,742	439,189
Pacific Coast Region				
CALIFORNIA AND OREGON	Initial	41,816	34,658	5,984,440
	Reeradication	74,426	44,154	4,342,235
	Totals	116,242	78,816	10,326,675



TABLE 3
SUMMARY OF RIBES READICATION BY AGENCY AND BY LAND OWNERSHIP IN THE PACIFIC COAST REGION - 1947

Work Agency	Acres		Per Acre Worked		Acres Covered				Ownership Status				Ribes eradicated				Acres Ribes-Free At Re-eradication
	Worked	Blocked Out	Total	G-Hour Man Days	Federal				Federal				Federal				
					National Forest	Private	State	Total	National Forest	Private	State	Total	National Forest	Private	State	Total	
Initial Work																	
California:																	
B.E.P.C.	15,791	1,722	17,513	13,831	2,665	14,078	770	2,665	2,606	10,810	415	2,606	558,891	1,790,227	13,438		
Forest Service	10,796	859	11,655	12,953	6,609	5,046		6,609	7,306	5,647		7,306	2,110,630	697,706			
Park Service	3,092		3,092	4,968	3,092			3,092	4,966			4,966	725,804				
Subtotals -	29,679	2,581	32,260	31,750	9,274	3,092		9,274	9,912	16,457	415	16,457	3,395,125	2,487,933	13,438		
Oregon:																	
Forest Service	1,201	859	2,060	1,927	2,760	1,932		4,692	1,927	329		316	44,843	34,292			
O & C Admin.	2,431	4,365	6,796	9,985	1,852	4,864		6,716	1,940	656		2,596	45,187	34,292			
Subtotals -	4,132	5,224	9,356	2,912	4,612			4,612	3,880			316	8,265	68,584			
Totals -	34,011	7,805	41,816	34,662	13,886	3,092		16,944	11,852	17,113	415	17,113	3,443,777	2,522,225	13,438		
Reeradication Work																	
California:																	
B.E.P.C.	17,943		17,943	9,617	5,474	12,469		5,474	3,044	6,573		3,044	357,860	694,201			5,373
Forest Service	27,604		27,604	16,553	18,876	8,928		18,876	12,532	4,421		12,532	1,385,399	654,541			11,103
Park Service	10,718		10,718	9,754	10,718			10,718	9,754			9,754	944,709				1,930
Subtotals -	56,465		56,465	36,324	35,068	21,397		35,068	25,576	10,994		25,576	2,687,968	1,309,222			18,516
Oregon:																	
Forest Service	10,388		10,388	4,267	35	9,798	1,060	3,724	3,724	514		29	132,224	21,420			6,790
O & C Admin.	17,573		17,573	3,563	2,222	6,666	9,227	3,681	1,027	2,355		1,027	36,918	142,271			19,000
Subtotals -	27,961		27,961	7,830	37	16,464	10,254	7,405	4,751	2,866		4,751	171,142	153,691			25,790
Totals -	74,426		74,426	44,154	35,067	27,384		35,067	30,327	13,853		30,327	3,114,401	2,875,722			44,307
All Workings																	
California:																	
B.E.P.C.	33,734	1,722	35,456	23,448	8,139	25,647	770	5,650	5,650	17,383	415	5,650	916,751	2,438,508	13,438		5,373
Forest Service	38,600	859	39,459	23,906	25,485	13,974		19,838	19,838	10,068		19,838	3,496,029	1,352,247			11,103
Park Service	13,610		13,610	14,720	13,610			14,720	14,720			14,720	1,670,513				1,930
Subtotals -	85,944	2,581	88,525	68,074	33,624	40,521	770	25,488	25,488	27,451	415	27,451	6,083,293	3,790,755	13,438		18,516
Oregon:																	
Forest Service	12,289	859	13,148	6,104	35	12,088	1,060	5,651	5,651	514		29	177,067	21,420			6,790
O & C Admin.	10,004	4,565	14,569	8,448	4,074	9,791		1,343	1,343	3,011		1,343	39,262	176,963			19,000
Subtotals -	22,293	5,424	27,717	14,552	40	21,879		7,000	7,000	3,525		3,525	216,329	298,383			25,790
Totals -	108,237	7,805	116,042	82,626	40,664	62,400	770	32,488	32,488	30,976	415	30,976	6,300,022	3,819,138	13,438		44,307



TABLE 4

SUMMARY OF CHEMICAL SPRAY WORK IN THE
PACIFIC COAST REGION - 1947

Operation	Agency	Acres Covered	Man Days			Ribes Sprayed	Gal. of Spray Used	Per Acre			Ribes Per Gal.
			Eff- ective*	Super- visory**	Total			Man Days	Gal. Spray	Ribes	
Plumas	EQ	302	407	50	457	513,600	97,950	1.35	324	1,701	5.24
Lassen	EQ	157	110	30	140	63,751	22,275	0.70	142	406	2.86
Stanislaus	FS	309	199	61	260	455,200	51,700	0.64	167	1,473	8.80
Eldorado	FS	385	173	41	214	226,500	52,100	0.45	135	588	4.35
Sierra	FS	283	351	56	407	492,800	70,400	1.24	249	1,741	7.00
Yosemite	NPS	85	201	42	243	61,000	64,875	2.36	763	718	0.94
Kings Canyon	NPS	33	14	-	14	8,809	725	0.42	22	267	12.15
Agency Totals	EQ	459	517	80	597	577,351	120,225	1.13	262	1,258	4.80
	FS	977	723	158	881	1,174,500	174,200	0.74	178	1,202	6.74
	NPS	118	215	42	257	69,809	65,600	1.82	556	592	1.06
Grand Totals		1,554	1,455	280	1,735	1,821,660	360,025	0.94	232	1,172	5.06

*Nozzle and operator man days

**Principally the foreman's time

TABLE 5

CUMULATIVE SUMMARY OF CHEMICAL SPRAY WORK 1946-1947
IN THE PACIFIC COAST REGION

Operation	Agency	Acres Covered	Man Days			Ribes Sprayed	Gal./of Spray Used	Per Acre			Ribes Per Gal.
			Eff- ective*	Super- visory**	Total			Man Days	Cal. Spray	Ribes	
Plumas	EQ	349	473	59	532	580,407	108,350	1.36	310	1,663	5.36
Lassen	EQ	157	110	30	140	63,751	22,275	0.70	142	406	2.86
Stanislaus	EQ	281	154	24	178	204,591	30,550	0.55	109	728	6.70
Stanislaus	FS	309	199	61	260	455,200	51,700	0.64	167	1,473	8.80
Eldorado	FS	385	173	41	214	226,500	52,100	0.45	135	588	4.35
Sierra	FS	283	351	56	407	492,800	70,400	1.24	249	1,741	7.00
Yosemite	NPS	85	201	42	243	61,000	64,875	2.36	763	718	0.94
Kings Canyon	NPS	33	14	-	14	8,809	725	0.42	22	267	12.15
Agency Totals	EQ	787	737	113	850	848,749	161,175	0.94	205	1,079	5.27
	FS	977	723	158	881	1,174,500	174,200	0.74	178	1,202	6.74
	NPS	118	215	42	257	69,809	65,600	1.82	556	592	1.06
Grand Totals		1,882	1,675	313	1,988	2,093,058	400,975	0.89	213	1,112	5.22

*Nozzle and operator man days

**Principally the foreman's time

TABLE 6

SUMMARY OF RIBES ERADICATION BY CONTRACT - 1947

National Forest	Agency	Acres Contracted	Estimated 8-Hour Man Days	Ribes Eradicated	Per Acre		Average Bid Price Per Acre	Contract Cost	Acres Ribes Free At Time Of Eradication
					8-Hr. Man Days	Ribes			
Initial Work									
California:									
Klamath	FS	202	37	13,419	.18	66.4	\$ 5.25	\$ 1,060.50	-
Oregon:									
Umpqua	FS	413	180	4,799	.44	11.6	4.50	1,858.50	367
Totals	All	615	217	18,218	.35	29.5	4.75	2,919.00	367
Reeradication									
California:									
Plumas	FS	560	368	28,906	.66	51.6	7.25	4,060.00	-
Oregon:									
Siskiyou	FS	431	176	3,755	.41	8.7	10.32	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	15.7	8.12	6,264.20	784
Rogue	FS	3,881	805	65,373	.21	16.8	5.52	21,415.55	2,470
Subtotals	All	5,083	1,342	81,203	.26	16.0	6.32	32,129.75	4,863
Totals	All	5,643	1,710	110,109	.30	19.6	6.41	36,189.75	4,863
All Workings									
California:									
Klamath	FS	202	37	13,419	.18	66.4	5.25	1,060.50	-
Plumas	FS	560	368	28,906	.66	51.6	7.25	4,060.00	-
Subtotals	All	762	405	42,325	.53	55.4	6.72	5,120.50	-
Oregon:									
Umpqua	FS	413	180	4,799	.44	11.6	4.50	1,858.50	367
Siskiyou	FS	431	176	3,755	.41	8.7	10.33	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	15.7	8.12	6,264.20	784
Rogue	FS	3,881	805	65,373	.21	16.8	5.52	21,415.55	2,470
Subtotals	All	5,496	1,522	86,002	.28	15.6	6.18	33,988.25	5,230
Totals	All	6,258	1,927	128,327	.31	20.5	6.25	43,108.75	5,230

TABLE 7

CUMULATIVE SUMMARY OF RIBES ERADICATION BY CONTRACT 1946-1947

National Forest	Agency	Acres Contracted	Estimated 8-Hour Man Days	Ribes Eradicated	Per Acre 8-Hr. Man Days	Average Bid Price Per Acre	Contract Cost	Acres Ribes Free At Time Of Eradication
Initial Work								
California:								
Klamath	FS	202	37	13,419	.18	5.25	1,060.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Totals	All	615	217	18,218	.35	4.75	2,919.00	367
Reeradication								
California:								
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Oregon:								
Siskiyou	FS	431	176	3,755	.41	10.32	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	4,051	350	68,701	.21	5.74	23,215.55	3,000
Subtotals	All	5,253	1,387	84,531	.26	6.34	33,929.75	5,393
Totals	All	5,813	1,755	113,437	.33	6.54	37,989.75	5,393
All Workings								
California:								
Klamath	FS	202	37	13,419	.18	5.25	1,060.50	-
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Subtotals	All	762	405	42,325	.53	6.72	5,120.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Siskiyou	FS	431	176	3,755	.41	10.33	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	4,051	850	68,701	.21	5.74	23,215.55	3,000
Subtotals	All	5,666	1,567	89,330	.28	6.31	35,788.25	5,760
Totals	All	6,428	1,972	131,665	.31	6.37	40,908.75	5,760

TABLE 8

SUMMARY OF RIBES READIATION BY LAND OWNERSHIP AND NUMBER OF WORKING IN THE PACIFIC COAST REGION - 1947

Land Ownership	Status of Ribes Eradication																		Total All Forbids		
	First Working			Second Working			Third Working			Fourth Working			Fifth Working			Sixth Working					
	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated			
National Forest	9,274	9,912	2,669,521	7,952	5,926	705,692	9,111	4,993	421,959	6,902	4,140	593,728	215	111	16,669	170	66	33,624	25,468	4,432,740	
National Park	3,092	4,966	729,804	9,282	7,537	604,533	1,132	6,878	291,272	324	339	44,504	170	66	2,301	13,810	25,468	4,432,740	25,468	4,432,740	
Subtotals - Federal	12,366	14,878	3,398,325	17,234	13,463	1,310,325	10,243	11,876	713,272	7,226	4,479	642,632	215	111	16,669	170	66	47,434	50,938	8,865,480	
Private	19,124	16,457	2,487,913	9,101	5,269	564,394	8,361	3,480	323,167	3,810	2,183	365,750	125	60	9,492	40,321	27,451	3,190,755	3,190,755	6,381,235	
State	770	415	13,415													770	415	13,415	13,415	26,830	
Totals	32,260	31,750	5,896,636	26,335	18,732	1,874,719	18,604	10,351	1,036,439	11,036	7,004	1,026,382	340	171	26,161	170	66	88,725	9,857,465	14,743,915	
Oregon																					
National Forest	2,640	1,940	45,187	2,478	1,494	57,858	4,154	1,352	67,293	2,911	980	43,347	174	79	2,644			12,557	5,845	216,129	
O & C Rev. Lands Admin.	1,692	3,16	8,265	2,236	1,091	16,401	21	5	211									4,109	1,572	20,477	
Subtotals - Federal	4,332	5,106	53,452	4,714	2,585	74,259	4,175	1,357	67,504	2,911	980	43,347	174	79	2,644			16,666	7,417	24,546	
Private	8,681	8,696	3,432	2,721	2,721	147,403	312	36	7,317	324	339	48,904	170	66	2,301			10,351	3,576	197,983	
Totals	13,013	13,802	57,885	7,435	5,306	221,662	4,487	1,453	74,821	3,235	1,319	92,251	344	145	4,945			27,017	9,412	414,129	
Pacific Coast Region																					
National Forest	12,114	11,692	2,714,708	10,430	7,420	766,460	13,265	6,345	489,252	9,813	5,460	637,075	369	190	19,313	170	66	46,181	31,333	4,639,103	
National Park	3,092	4,966	729,804	9,282	7,537	604,533	1,132	6,878	291,272	324	339	44,504	170	66	2,301	13,810	25,468	13,810	14,720	1,570,513	
O & C Rev. Lands Admin.	1,692	3,16	8,265	2,236	1,091	16,401	21	5	211							4,109	1,572	4,109	1,572	20,477	
Subtotals - Federal	16,898	19,714	3,452,777	12,948	16,048	1,387,394	14,418	8,228	780,735	10,137	5,799	665,979	369	190	19,313	170	66	64,100	37,412	6,231,592	
Private	23,988	17,113	2,522,225	14,473	7,990	731,797	8,673	3,576	331,103	4,102	2,234	354,026	136	63	9,587	59,372	31,136	59,372	31,136	6,231,592	
State	415	13,415	13,415													415	13,415	13,415	13,415	26,830	
Totals	41,301	34,668	5,984,440	36,401	23,998	2,119,191	23,091	11,804	1,119,638	14,239	8,033	1,080,005	525	253	28,900	170	66	115,242	75,416	10,462,675	
Grand Totals	41,301	34,668	5,984,440	36,401	23,998	2,119,191	23,091	11,804	1,119,638	14,239	8,033	1,080,005	525	253	28,900	170	66	115,242	75,416	10,462,675	

TABLE 9

SUMMARY OF RIBES READIATION BY LAND OWNERSHIP AND NUMBER OF WORKING IN THE PACIFIC COAST REGION 1925-1947

Land Ownership	Status of Ribes Eradication																		Total All Forbids		
	First Working			Second Working			Third Working			Fourth Working			Fifth Working			Sixth Working					
	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated	Acres Worked	6-Hour Men Days	Ribes Eradicated			
California																					
National Forest	313,175	281,572	54,576,466	166,595	98,029	16,665,387	57,539	37,183	6,436,148	14,910	9,307	1,122,270	3,623	1,297	168,693	170	66	556,032	79,148	78,271,215	
National Park	96,646	123,112	17,584,047	36,846	35,767	4,329,120	5,210	5,713	541,078	324	339	48,904			2,301			144,125	27,149,101	27,149,101	
Subtotals - Federal	411,820	404,684	72,160,513	203,441	133,796	20,994,507	62,749	42,916	6,977,226	15,234	9,646	1,171,174	3,623	1,297	168,693	170	66	700,157	105,158,216	105,158,216	
Private	377,608	266,812	56,659,847	166,791	94,821	9,913,918	48,825	21,986	3,059,681	9,703	5,822	653,773	415	115	12,099			601,442	389,456	72,239,150	
State	5,691	3,531	532,144	2,213	814	44,114	155	41	1,187									8,009	4,386	57,116	
Totals	795,069	645,087	133,352,504	372,445	229,431	30,952,539	111,723	64,943	10,038,094	24,937	15,466	1,824,947	4,038	1,412	180,742	170	66	1,308,408	956,407	174,331,427	
Oregon																					
National Forest	96,646	57,365	15,804,510	34,377	15,218	1,288,724	9,875	5,369	278,029	4,104	1,798	57,744	174	79	2,644			145,178	79,829	17,131,611	
National Park	13,750	14,756	1,082,167	5,356	3,569	13,450	709	850	10,557						3,982			493	145,292		
O & C Rev. Lands Admin.	134,020	17,652	1,680,500	18,042	18,468	1,375,936	10,584	6,169	288,586	4,104	1,798	57,744	174	79	2,644			49,774	13,127	1,150,466	
Subtotals - Federal	113,927	17,652	1,690,500	18,745	5,149	1,340,424	1,011	418	289,587	400	112	10,967	11	5	95			198,534	59,140	18,128,720	
Private																		134,094	23,352	2,866,683	
State	712	217	10,800	56,787	24,017	1,716,160	11,595	6,605	315,283	4,504	1,910	68,711	185	82	2,739			712	217	10,800	
Totals	256,669	90,404	18,972,119	56,787	24,017	1,716,160	23,480	12,784	605,424	8,608	3,810	127,462	196	87	3,478	170	66	333,740	122,744	21,005,212	
Pacific Coast Region																					
National Forest	409,823	308,937	70,280,976	200,972	113,247	17,954,111	67,414	42,552	6,714,177	19,024	11,105	1,180,014	3,797	1,376	171,287	170	66	701,210	147,283	96,402,816	
National Park	102,271	123,112	17,584,047	36,846	35,767	4,329,120	5,210	5,713	541,078	324	339	48,904			2,301			144,125	16,749	27,149,101	
O & C Rev. Lands Admin.	43,170	34,758	1,086,147	5,315	3,569	13,450	709	800	10,557						3,982			49,774	19,127	1,150,466	
Subtotals - Federal	550,890	447,279	89,141,332	243,463	152,684	22,270,443	73,123	49,085	7,265,812	19,358	11,444	1,228,918	3,797	1,376	171,287	170	66	895,991	661,914	120,140,031	
Private	491,528	284,461	56,659,847	166,791	94,821	9,913,918	48,825	21,986	3,059,681	9,703	5,822	653,773	415	115	12,099			737,156	412,908	74,564,031	
State	6,333	3,748	532,144	2,213	814	44,114	155	41	1,187									44,721	4,603	588,815	
Totals	1,052,738	735,491	145,294,623	412,472	250,319	32,668,899	123,324	71,544	10,367,377	29,466	17,378	1,893,668	4,223	1,404	183,481	170	66	1,642,148	1,079,455	195,316,116	



TABLE 10
(Omnibus Table 2 - Sheet 6)

ACREAGE WORKED ON INTERMINGLED LANDS IN THE PACIFIC COAST REGION - 1947

Intermingled Lands	First Working acres	Second Working acres	Other Workings Acres	All Workings acres
California	3,102	1,740	3,796	8,638
Oregon	4,864	5,372	419	10,655
Totals	7,966	7,112	4,215	19,293
Estimated Ribes Pulled	442,600	236,200	171,200	850,000
Estimated Men Days Used	5,180	3,850	1,860	10,890

TABLE 11
(Omnibus Table B - Sheet 2)

STATUS OF RIBES ERADICATION ON INTERMINGLED LANDS IN THE PACIFIC COAST REGION
AS OF DECEMBER 31, 1947

Intermingled Lands	Total Acres Intermingled Lands Control Area (White Pine and Protective Zone)	First Working		Second Working Acres	Other Workings acres	On Maintenance		Remaining Work Requiring	
		Acres	Cent			Acres	Per Cent	Unworked Acres	Acres
California	149,745*	58,455	39.04	28,924	11,752	7,286	4.87	91,210	51,169
Oregon	62,605	48,864	78.05	11,390	782	23,894	38.17	13,741	24,970
Totals	212,350*	107,319	50.54	40,314	12,534	31,180	14.68	104,951	76,139

*Correction of plus 80 acres on 1946 figures

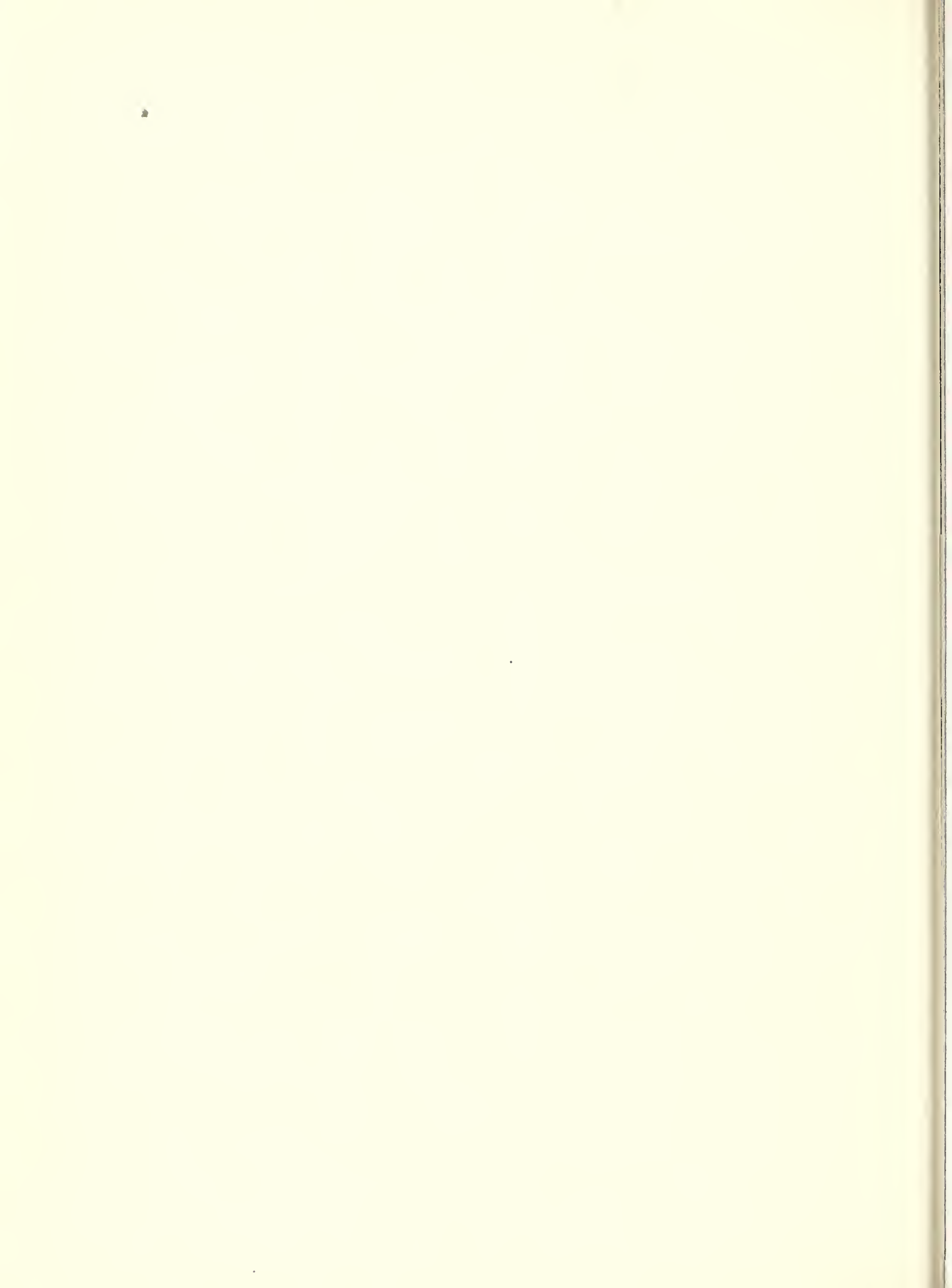


TABLE 12

THE DISTRIBUTION OF CAMPS IN THE PACIFIC COAST REGION - 1947

Control Operation	Agency and Fund	County	Number and Average Size of Camps	Approximate Period of Operation	Location
Oregon					
Umpqua	FS - Reg.	Douglas	1 - 20	June 15 - Aug. 30	Coffee Pot
Siskiyou	O&C - Reg.	Josephine	1-15 1-30 1-40	April 14 - Sept. 30	Quarria Creek - Salsa - Hayes Hill
Rogue River	FS - Reg.	Douglas	1 - 30	June 16 - Sept. 15	Poster Creek
	FS - Reg.	Jackson	1 - 30	May 6 - Sept. 5	Jim Creek
Klamath	FS - Reg.	Jackson	1 - 75	June 16 - Sept. 10	Cottonwood
California					
Klamath	FS - Reg.	Siskiyou	1 - 55	May 10 - Oct. 10	Doggett Creek
Lassen	State Div. of For. - CIA	Shasta	1 - 30	April 16 - Sept. 9	Whitmore
	EQ - Reg.	Tehama	1 - 50	April 29 - Aug. 29	Soda Springs
	EQ - Reg.	Butte	2 - 50	May 8 - Aug. 22	Reg Dump - Ramsey Bar
	EQ - Reg.	Plumas	1 - 50	June 3 - Aug. 15	Humbag
	EQ - Reg.	Plumas	2 - 50	May 1 - Aug. 15	Camel Peak - Walter's Mine
Plumas	FS - Reg.	Plumas	1-20 2-40 1-50	May 5 - Oct. 14	Meadow Valley - Canyon Dam
	FS - Reg. *	Butte	1 - 50	May 6 - June 18	Hatray Creek - Granite Basin
	FS - Reg.	Butte	1 - 50	May 9 - Oct. 14	Merrimac
El Dorado	State Div. of For. - CIA	Amador	1 - 15	May 5 - Oct. 9	Dev Drop
	EQ - Reg.	El Dorado	1 - 15 2 - 50	April 23 - Aug. 30	Snowline - Davis Cabin - Cold Spring
	FS - Reg.	El Dorado	1 - 30 2 - 50	May 13 - Sept. 25	China Flat - Calder - Big Meadow
Stanislaus	EQ - Reg.	Tuolumne	1 - 50	April 23 - Sept. 15	Quinn Meadows
	FS - Reg.	Tuolumne	3 - 50	May 13 - Sept. 11	Bumblebee - Camp 17 - Thompson Meadows
Sierra	EQ - Reg.	Mariposa	1 - 50	June 4 - Aug. 18	Mead
	FS - Reg.	Mariposa	1 - 50	June 9 - Sept. 7	Summit
	FS - Reg.	Nevada	2 - 50	May 29 - Oct. 24	Gertrude Creek - Sequel
Sequoia-Kings Canyon	NP - Reg.	Tulare	3 - 50	May 12 - Sept. 7	Redwood Mountain
	NP - Reg.	Tuolumne	1 - 50	July 9 - Sept. 4	Red Fir - Marble Fork Carl Inn
Yosemite	NP - Reg.	Mariposa	4 - 50	April 17 - Oct. 24	Wawona - Sugar Pine Pass Crane Flat - Chiquapiin

*Merrimac transferred to Canyon Dam.

TABLE 13

SUMMARY OF CHECKING IN THE PACIFIC COAST REGION - 1947

Operation	Regular Check			Advance Check			Post Check		
	Acres Covered By Final Check	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days
Oregon									
Rogue River	8,726	5.7	234.3	-	-	-	13,848	4.6	221.6
Siskiyou	9,959	6.6	323.2	8,346	5.6	174.0	30,419	5.6	655.4
Umpqua	1,463	5.7	37.5	2,604	5.4	51.5	-	-	-
Totals	20,148	6.1	595.0	10,950	5.5	225.5	44,267	5.3	877.0
California									
Klamath	4,945	7.9	140.8	2,726	2.3	19.2	-	-	-
Lassen	12,306	5.0	248.1	18,834	3.6	333.6	6,432	3.4	98.8
Plumas	17,980	4.1	371.4	6,268	2.7	115.5	20,604	3.9	318.6
Tahoe	-	-	-	12,694	2.6	250.0	-	-	-
Eldorado	13,188	4.3	262.8	8,446	2.5	116.1	2,720	3.1	61.1
Stanislaus	9,766	3.5	200.6	800	2.9	18.7	19,366	3.4	216.7
Sierra-Yosemite	14,451	4.3	406.5	8,251	2.7	137.5	22,563	2.5	269.0
Sequoia-Kings Canyon	5,042	5.0	105.5	1,966	2.4	27.9	4,894	3.5	69.6
Totals	77,673	4.5	1,735.7	59,985	2.9	1,018.5	76,579	3.3	1,033.8
Pacific Coast Region									
Totals	97,826	4.9	2,330.7	70,935	3.3	1,244.0	120,846	4.0	1,910.8

TABLE 14

ANALYSIS OF CHECKING COST AND PRODUCTION IN THE PACIFIC COAST REGION - 1947

State	Class Of Check	Man Days	Per Cent Of Total Man Days	Strip Acres	Strip Acres Per Man Day	Strip Acres Per Field Man Day	Total Cost	Cost Per Acre Basis Acres Covered By Check	Cost Per Strip Acre
Oregon	Regular	595.0	31.6	1,238.5	2.1	2.6	\$ 7,167.99	\$0.355	\$5.79
	Advance	225.5	12.0	606.4	2.7	3.4	2,755.44	0.251	4.54
	Post	877.0	46.5	2,332.3	2.7	3.4	10,519.55	0.237	4.51
	All	1,697.5	90.1	4,177.2	2.5	3.1	20,442.98	0.271	4.89
California	Regular	1,735.7	39.2	3,515.2	2.0	2.5	20,745.40	0.267	5.90
	Advance	1,018.5	23.0	1,740.4	1.7	2.3	11,495.74	0.191	6.60
	Post	1,033.8	23.4	2,498.3	2.4	3.1	12,587.76	0.161	4.95
	All	3,788.0	85.6	7,753.9	2.0	2.6	44,628.90	0.208	5.75
Totals Pacific Coast Region	Regular	2,330.7	36.9	4,753.7	2.0	2.6	27,913.59	0.285	5.87
	Advance	1,244.0	19.7	2,346.8	1.9	2.5	14,251.18	0.200	6.07
	Post	1,910.8	30.3	4,830.6	2.5	3.2	22,907.31	0.189	4.74
	All	5,485.5	87.0	11,931.1	2.2	2.8	\$65,071.88	\$0.224	\$5.45

MAPS OF ACTIVE CONTROL OPERATIONS SHOWING
THE STATUS OF BLISTER RUST CONTROL
AS OF DECEMBER 31, 1947

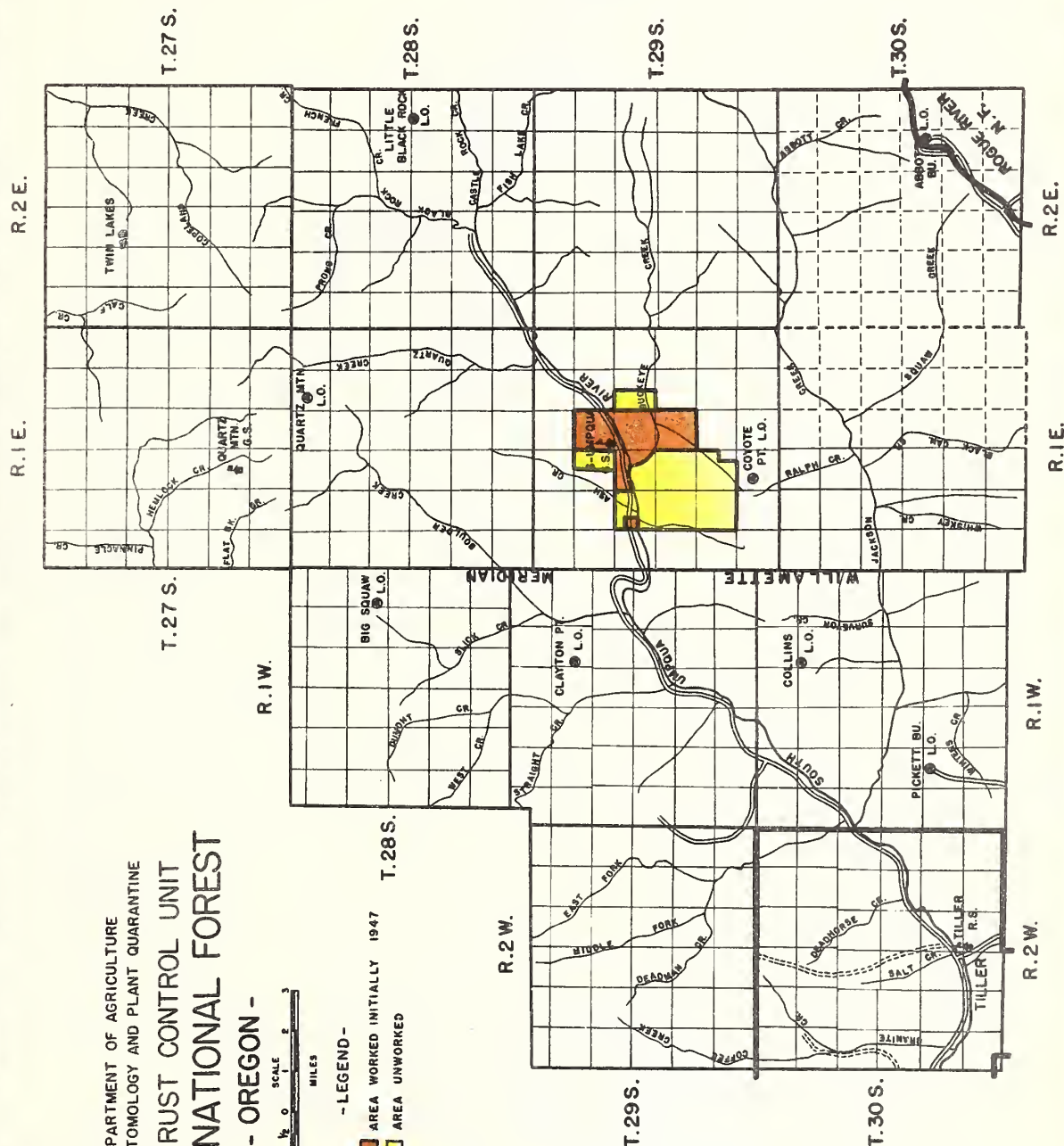


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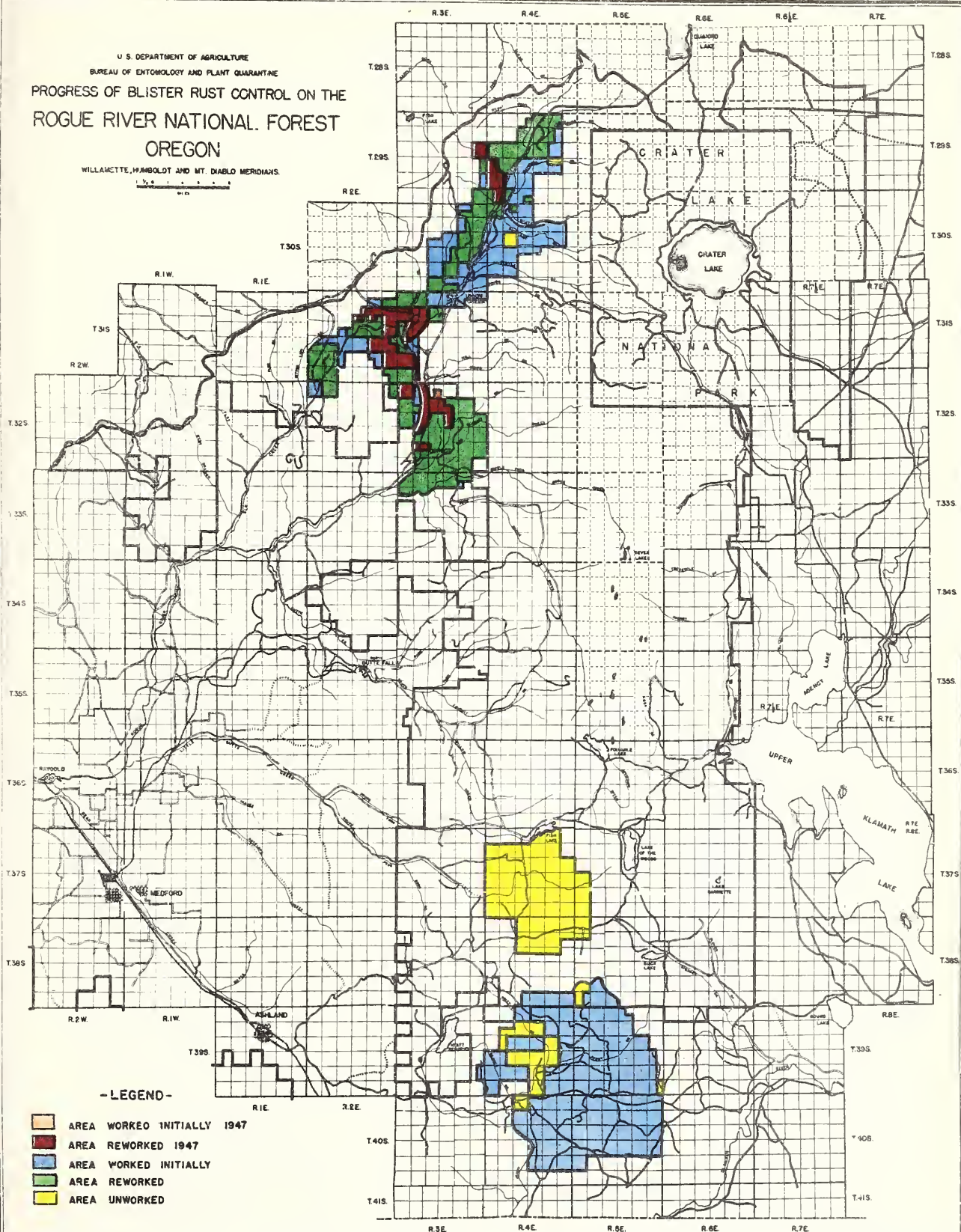


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PROGRESS OF BLISTER RUST CONTROL ON THE
ROGUE RIVER NATIONAL FOREST
OREGON

WILLAMETTE, HAMBOLT AND MT. DIABLO MERIDIANS.

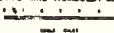


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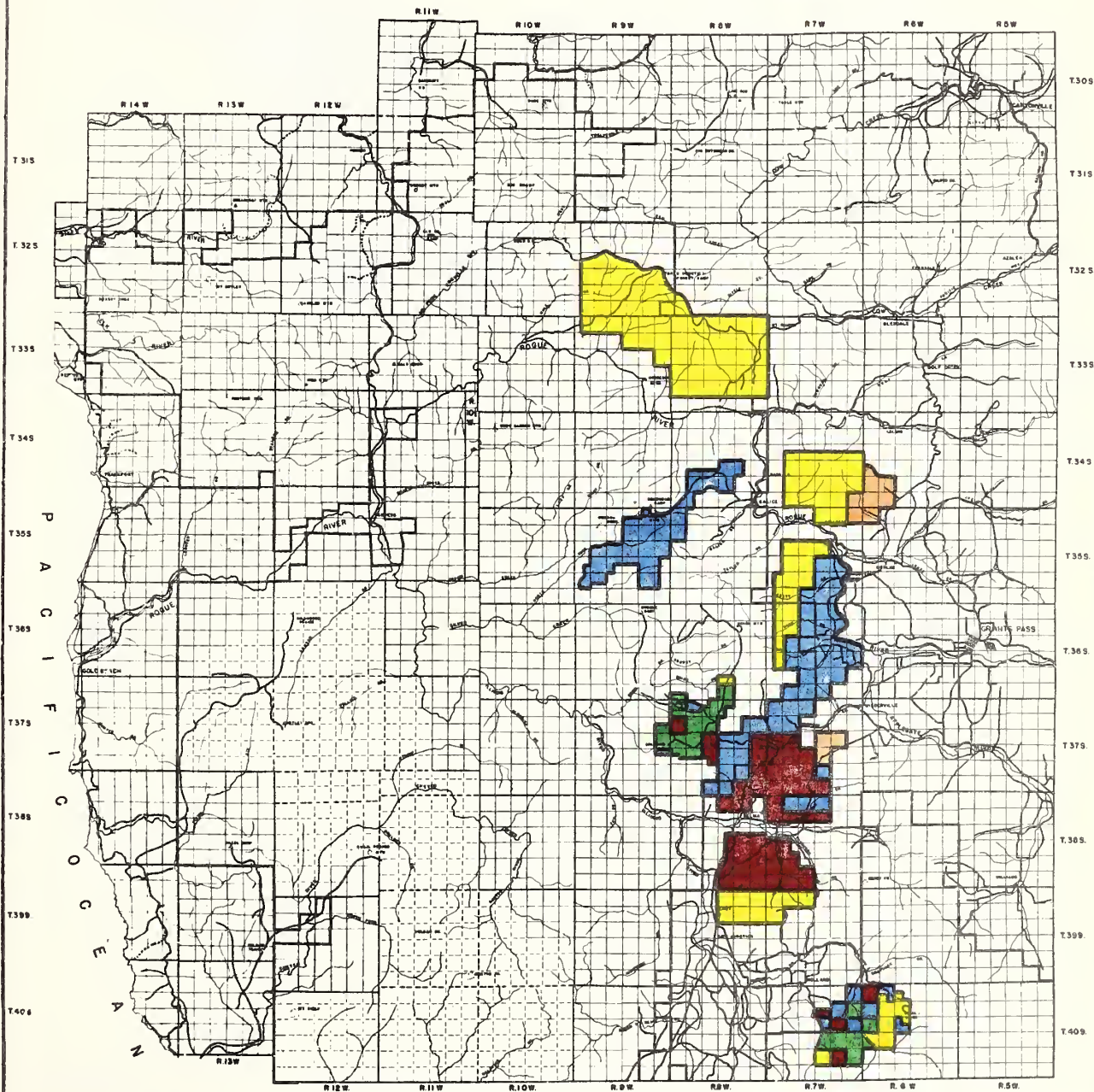
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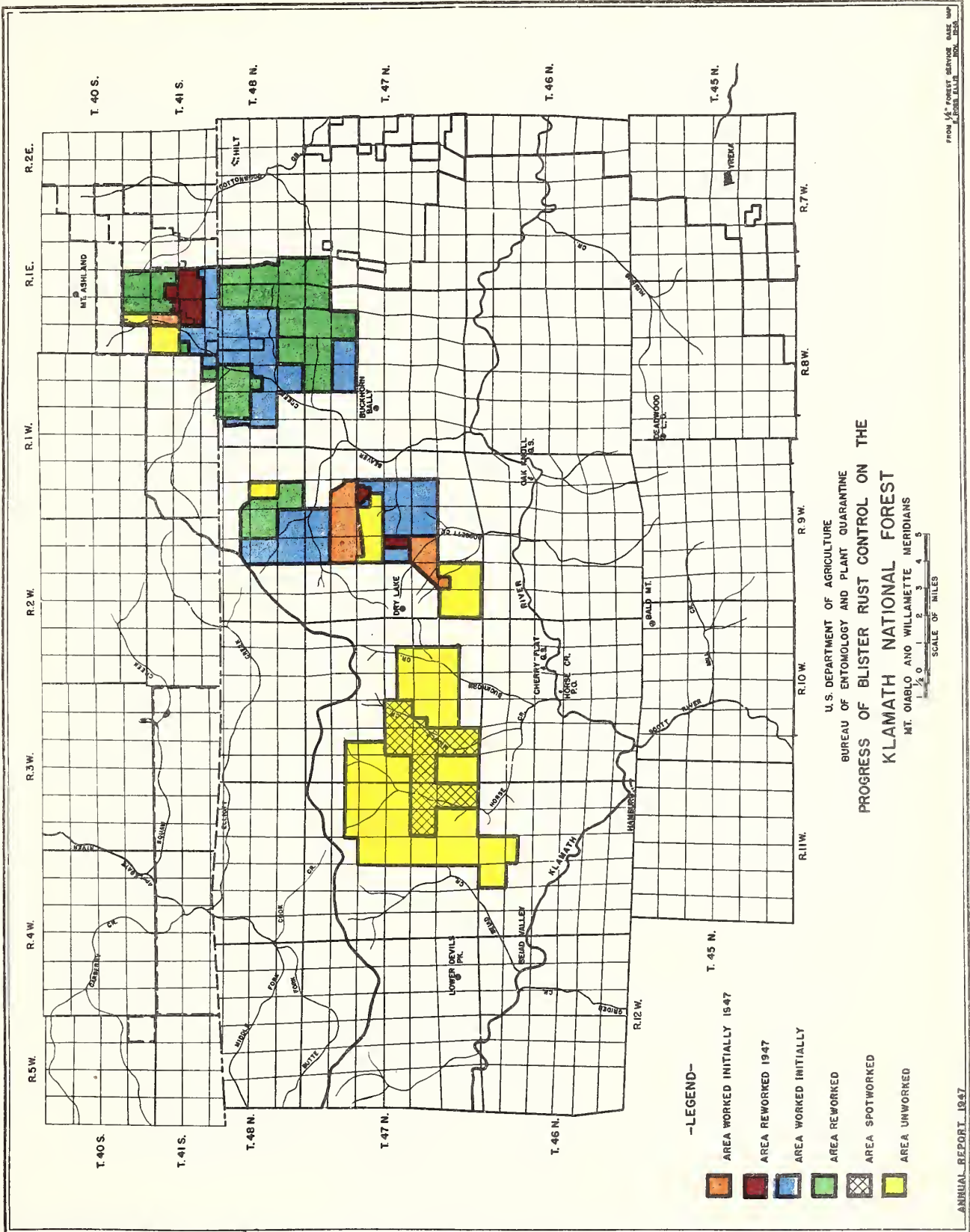


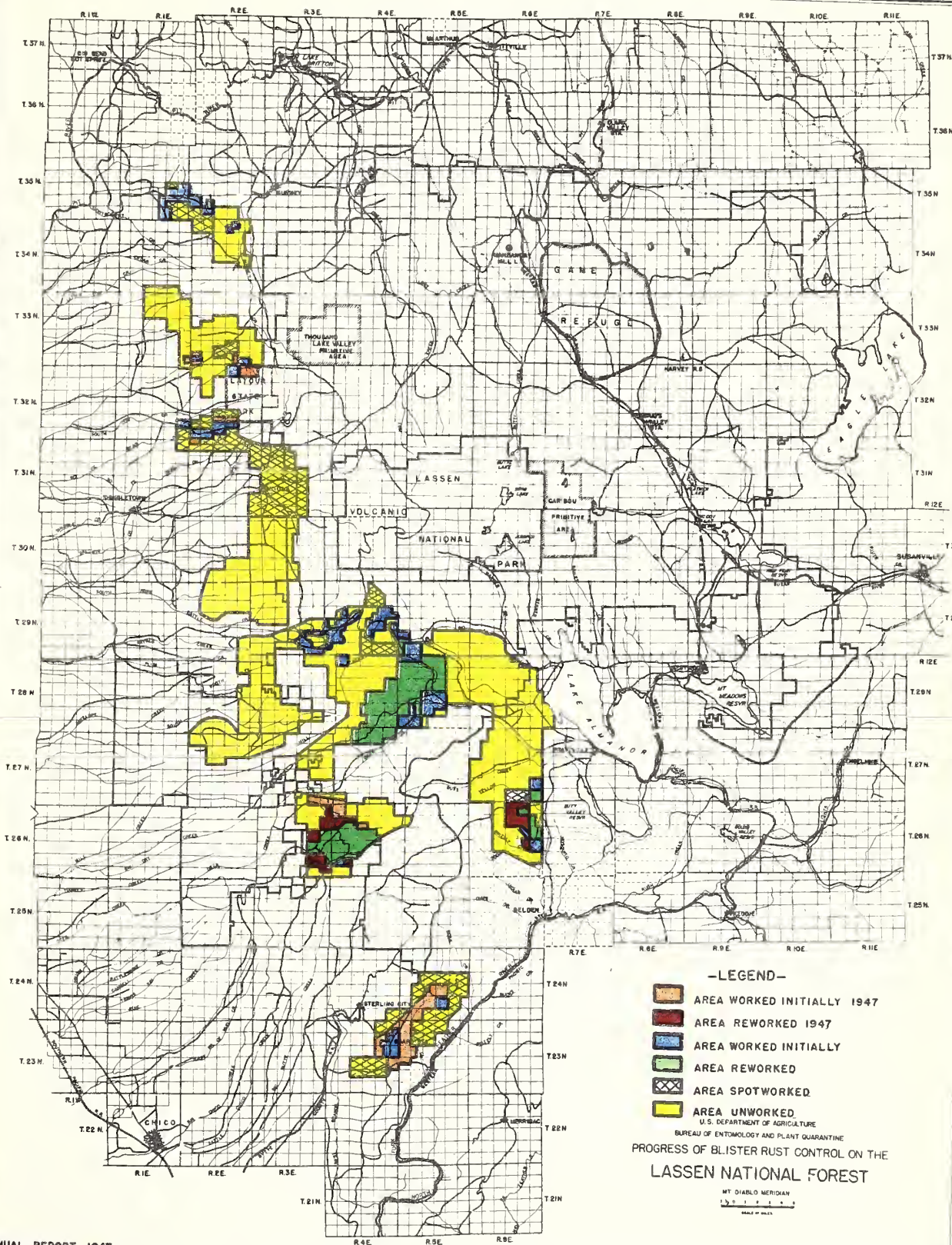
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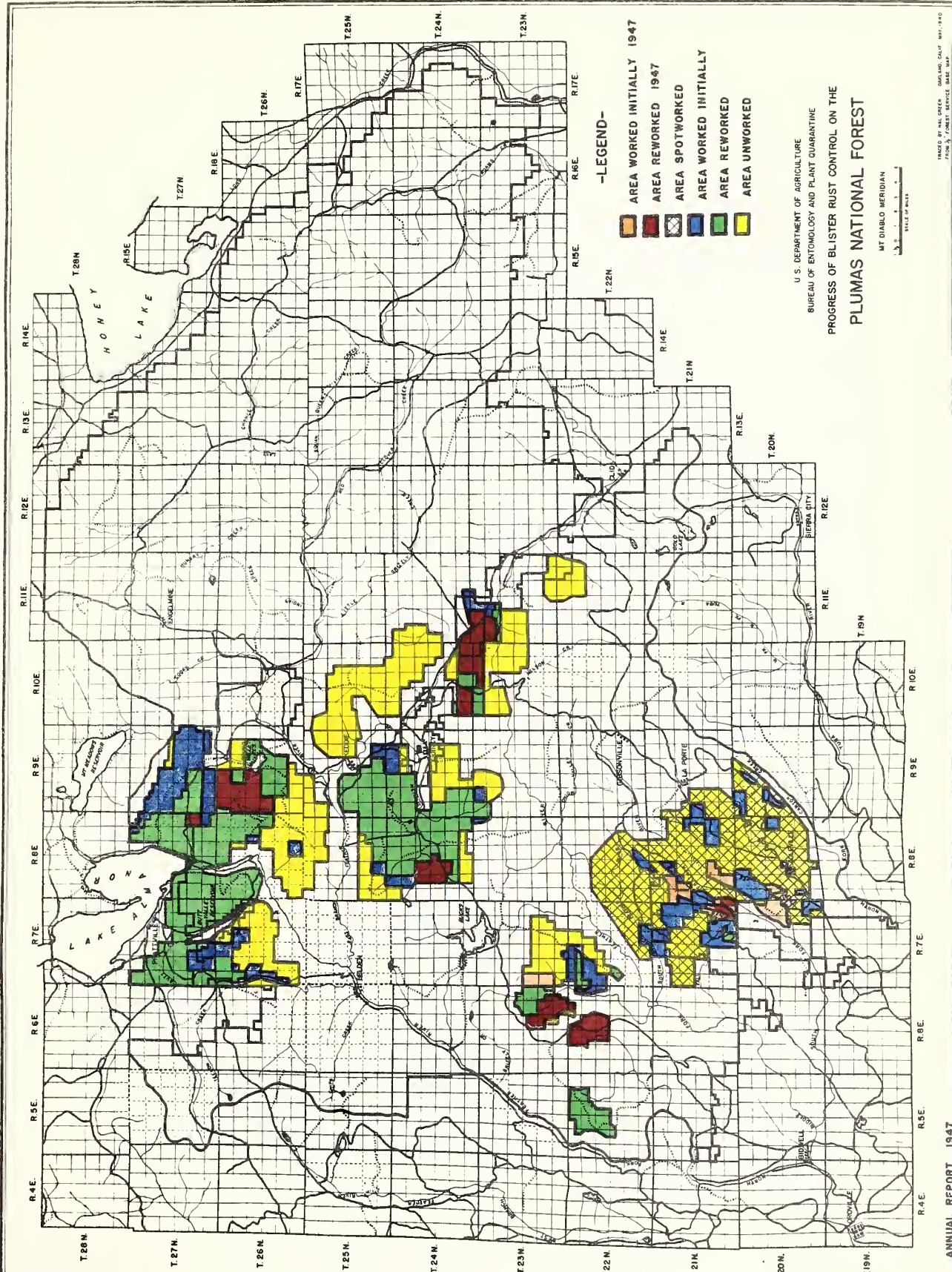




ANNUAL REPORT 1947

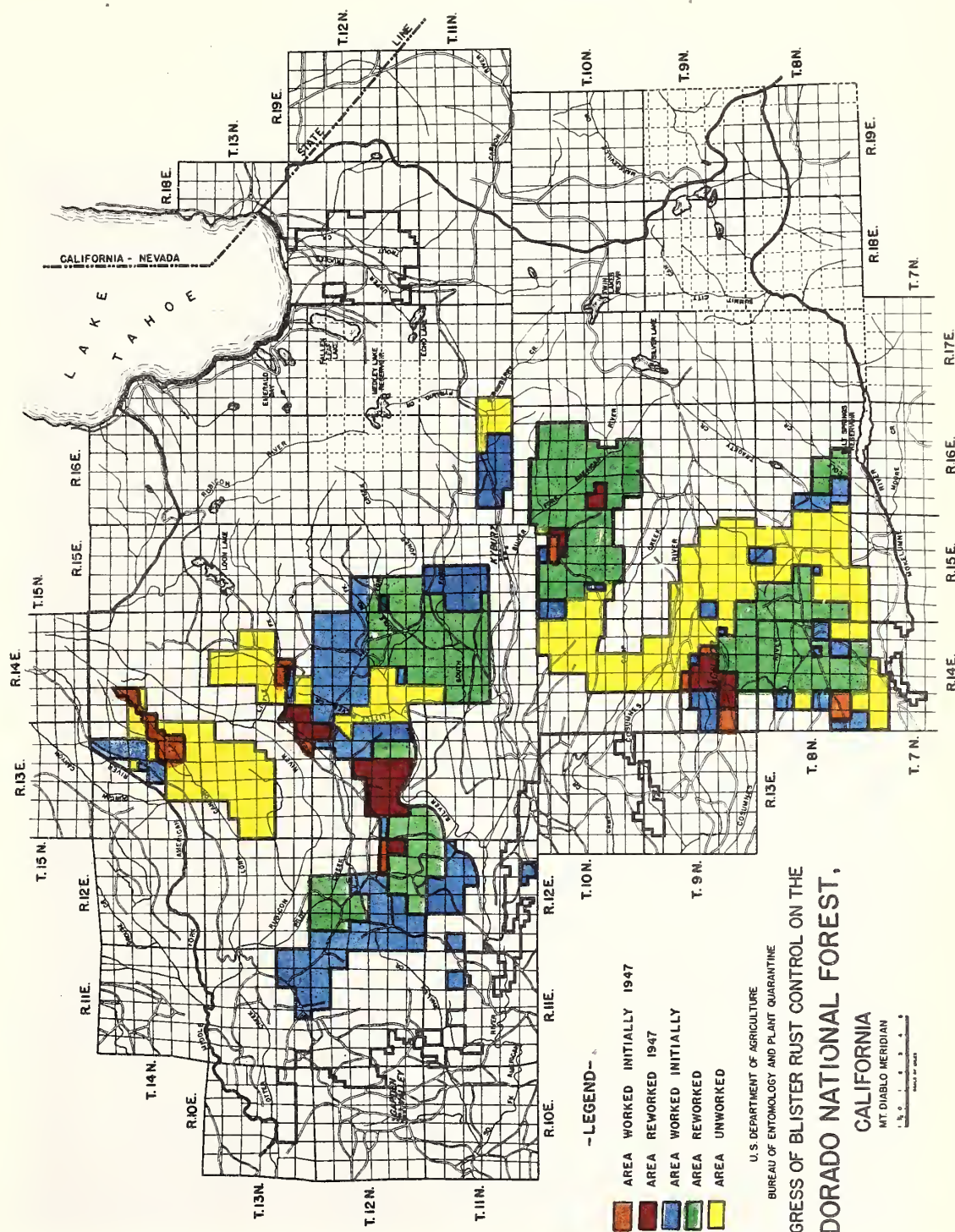
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FROM U.S. FOREST SERVICE BASE MAP





TRACED BY HAL GREEN OAKLAND, CALIF. MAR. 1947
FROM U.S. FOREST SERVICE BASE MAP







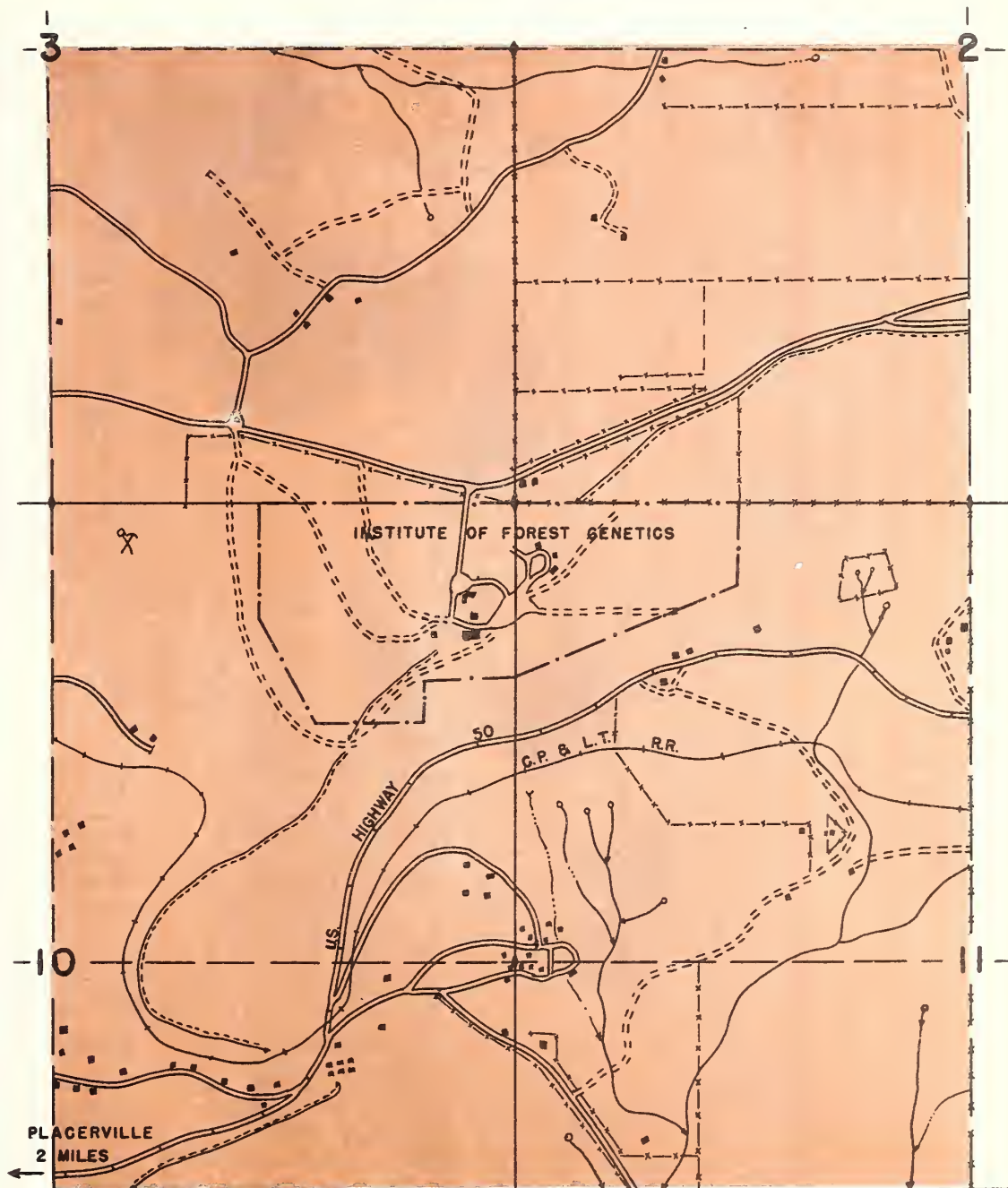
INSTITUTE OF FOREST GENETICS

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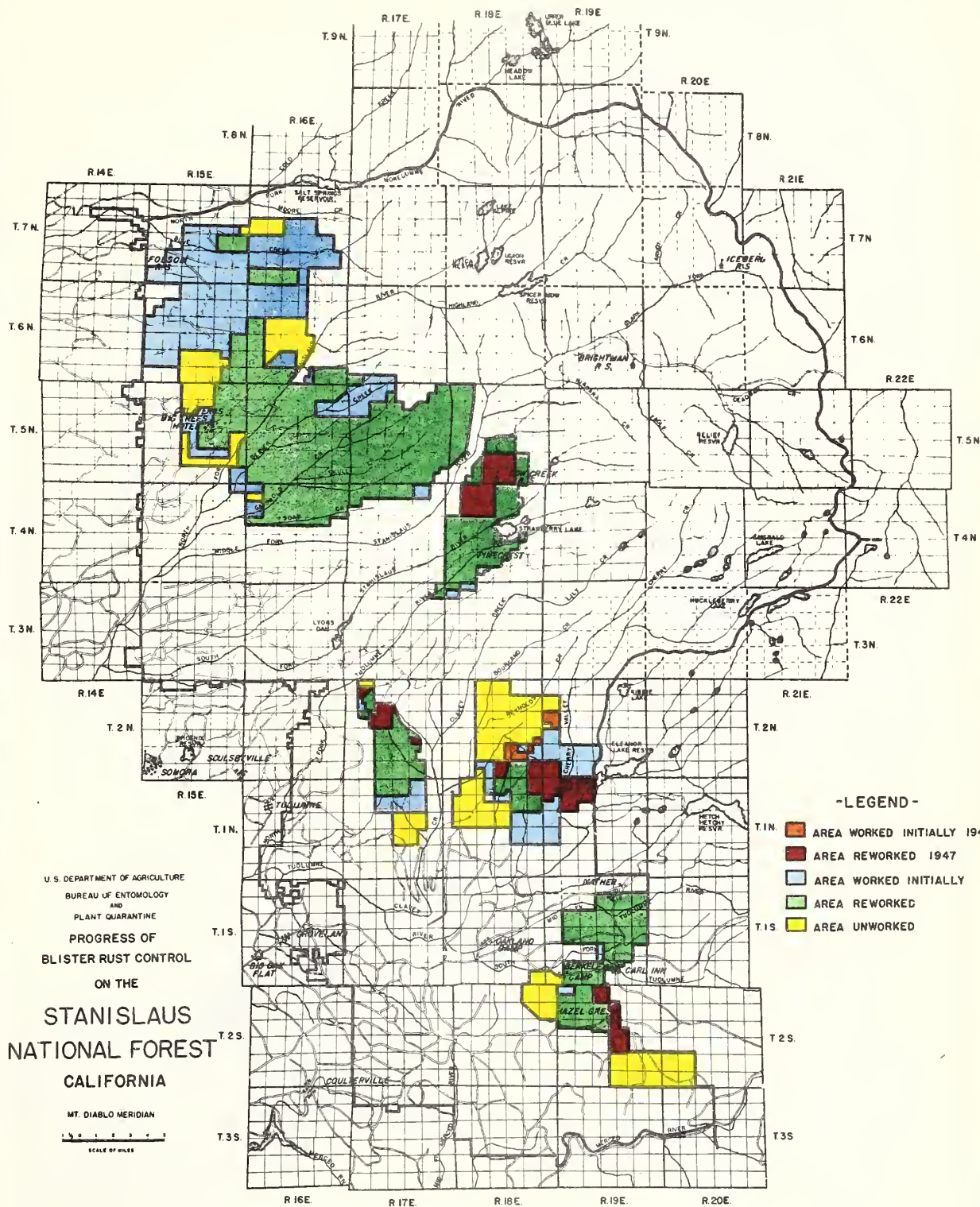
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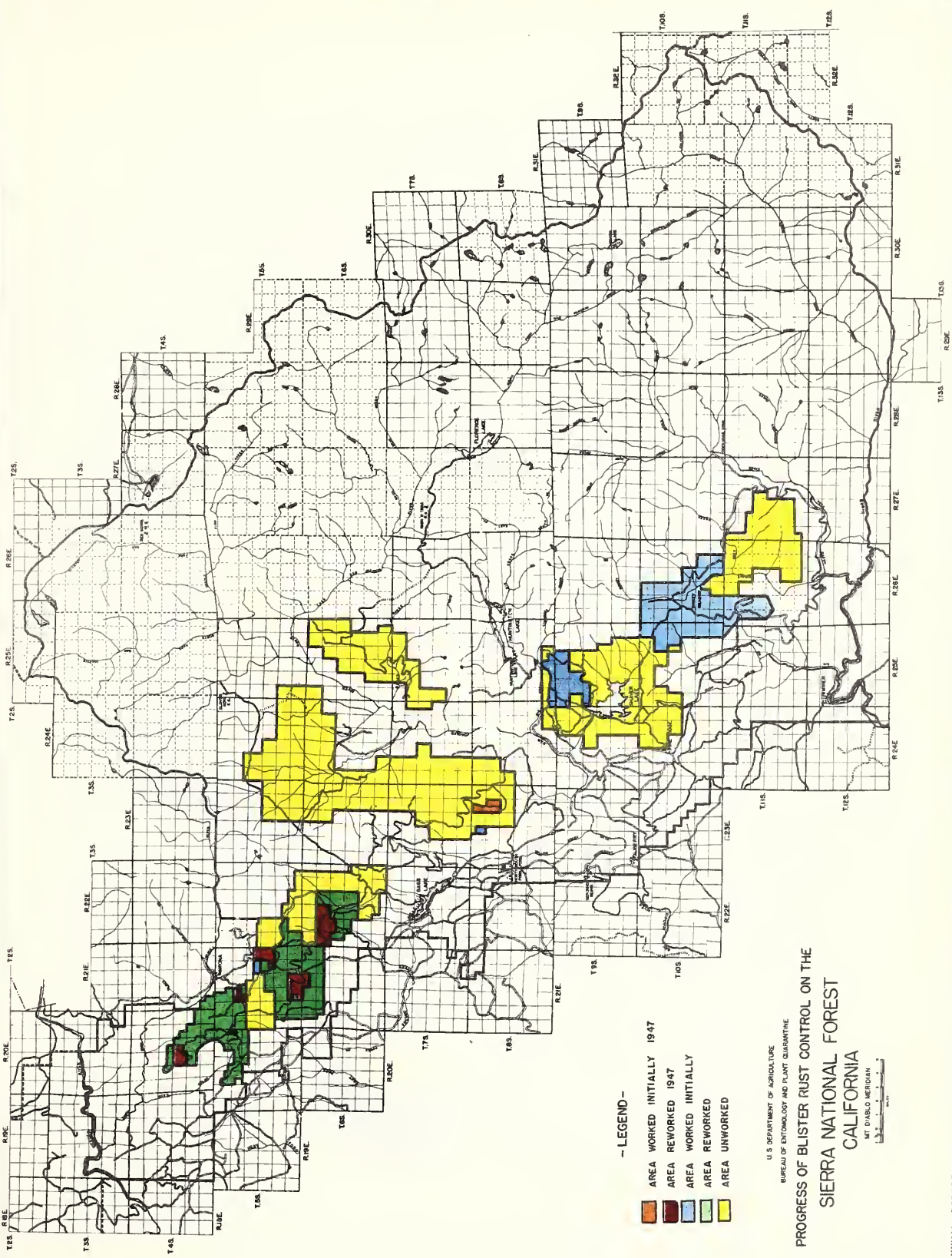
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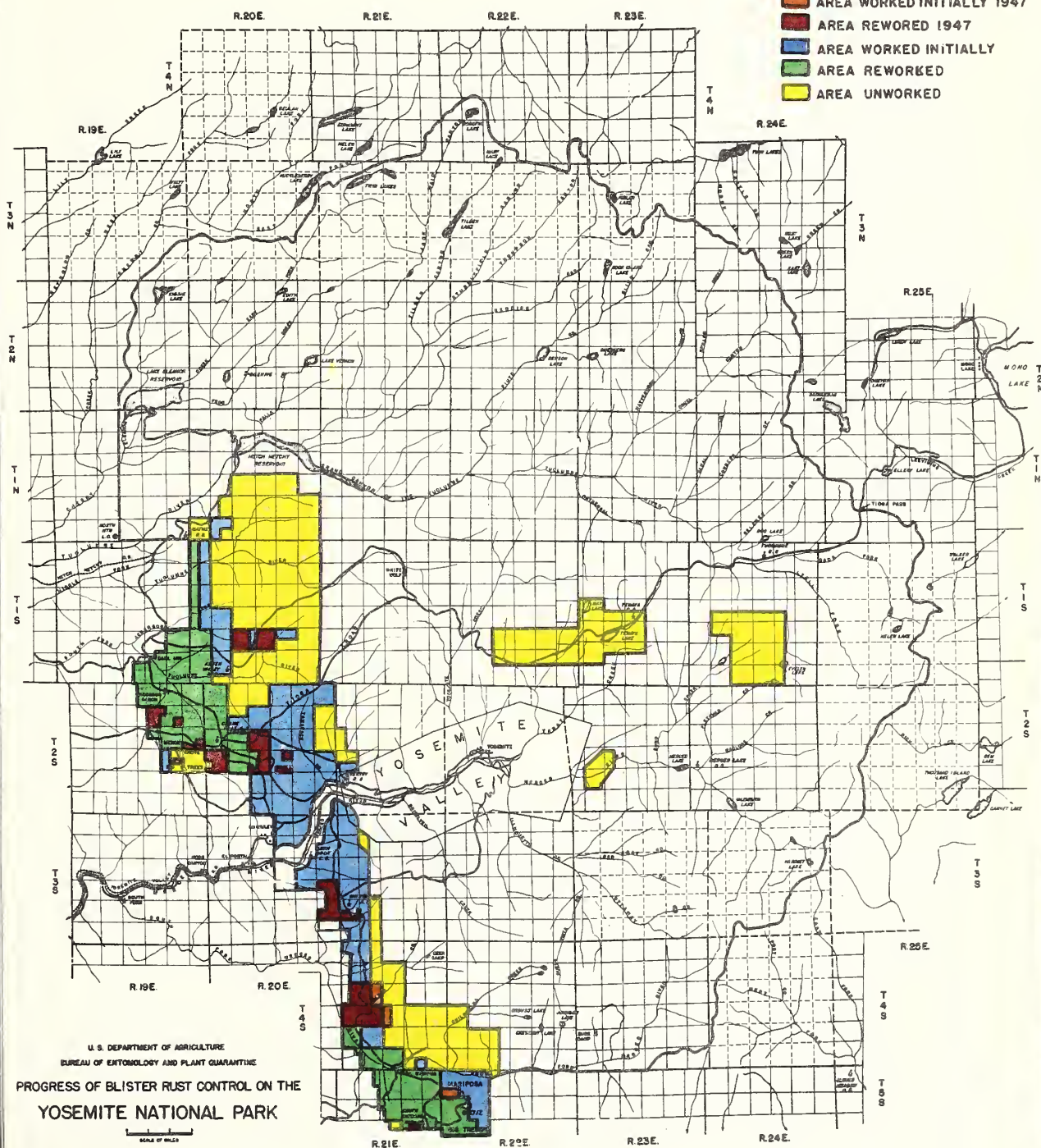
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 BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
 PROGRESS OF BLISTER RUST CONTROL ON THE
 SIERRA NATIONAL FOREST
 CALIFORNIA
 MT. DIABLO MERIDIAN





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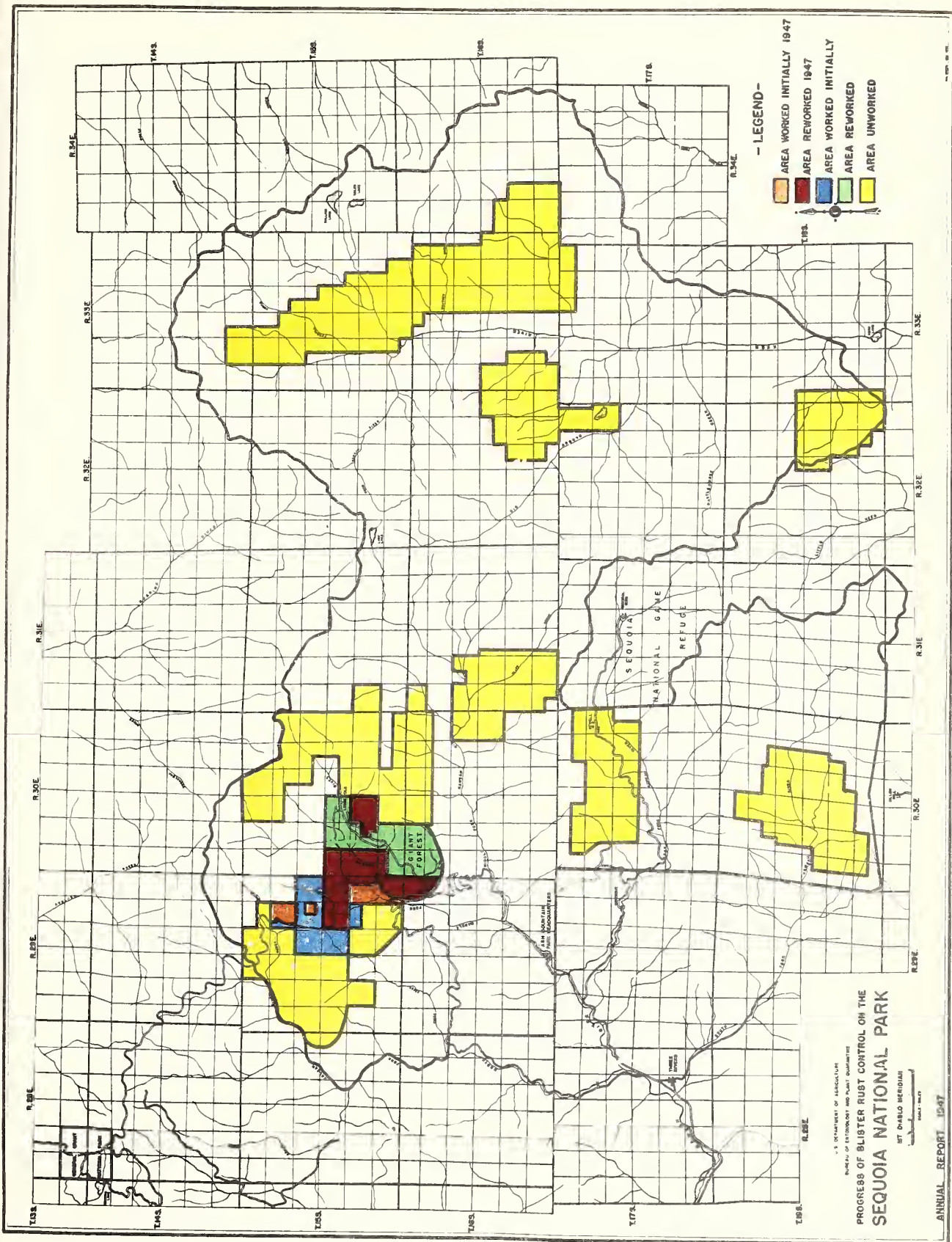
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PROGRESS OF BLISTER RUST CONTROL ON THE
YOSEMITE NATIONAL PARK

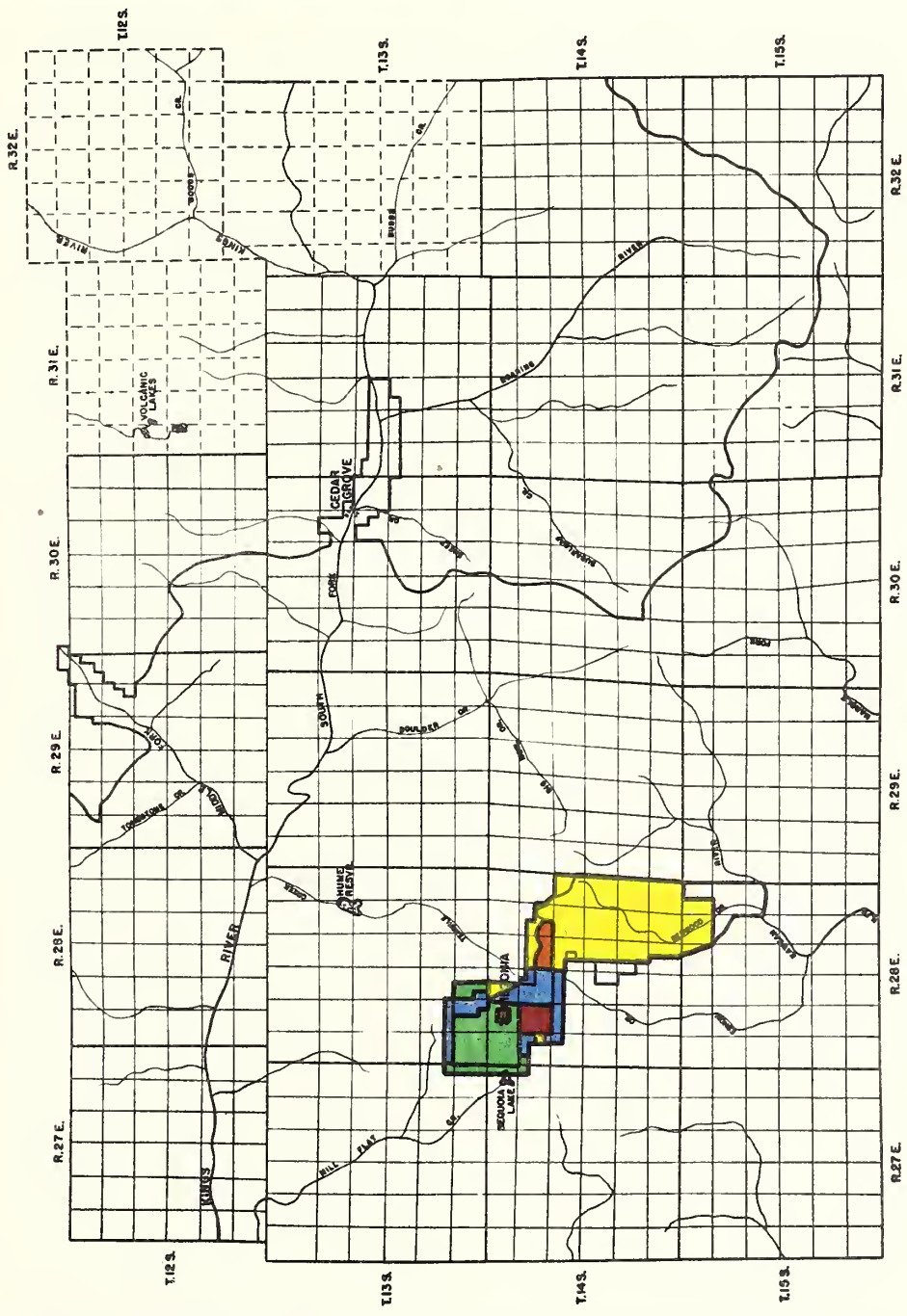
SCALE OF MILES

ANNUAL REPORT 1947

TRAISED FROM NATIONAL FOREST SERVICE MAP 101-1000
BY HALL REESE OAKLAND, CALIFORNIA MAY 1948







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U.S. DEPARTMENT OF AGRICULTURE
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**PROGRESS OF BLISTER RUST CONTROL ON THE
 KINGS CANYON NATIONAL PARK**
 MT. DIABLO BASE & MERIDIAN
 1 1/2 0 1 2 3 4 0
 SCALE OF MILES

PART III

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Financial Project BLR-3-5

By

Benton Howard, Forester

PURPOSE

To cooperate with the States of California and Oregon and with private timberland owners in the protection from white pine blister rust of those sugar pine stands which are in state and private ownership.

COOPERATION

Early in 1947 the United States Congress, considering appropriations for the control of blister rust in the fiscal year 1948, enunciated the policy that Federal money would be advanced for the cooperative projects to the same extent only that the states and private owners made funds available. That is, the Federal Government would match monies put forward by the states and timber owners, but would go no farther for the present. This placed squarely with the states the responsibility for the scope of control work in the immediate future. Presumably if no interest in the project was shown by the states and local agencies, no Federal money would be allotted.

Continuing the tangible interest it has shown in the protection of its sugar pine resource since 1941 when cooperative work was organized under the Lea Act, the State of California appropriated \$125,000 for the fiscal year ending June 30, 1948. This is an increase of \$50,000 annually over the previous appropriation. The Diamond Match Company and the Michigan-California Lumber Company continued their participation by contributing \$2,000 each, and the Winton Lumber Company continued its contribution of \$1,000. In view of the Federal action of 1947, this substantial financial support by the State of California and by private interests was of major significance in ensuring the continuation of blister-rust-control work on state and private lands. To match the cooperative monies the Federal Government allotted \$130,000 for control work on state and private lands.

In addition the Division of Forestry of California's Department of Natural Resources further increased the State's cooperation by assigning 40 youths to the project from the Youth Authority camps at Whitmore and Dew Drop.

Cooperative control work, which in 1947 was confined to California, was directed by the Bureau of Entomology and Plant Quarantine. Cooperative funds were deposited with the Secretary of the Treasury and administered under the regulations of the U. S. Department of Agriculture. Since earlier appropriations by the State of California were made for two-year periods, the current year marks the transition to a yearly basis.

LOCATION AND ORGANIZATION OF WORK

First priority was given to recently cut-over lands and second priority to high hazard areas where blister rust is present and likely to intensify within a few years. All work was confined to areas of high sugar-pine-producing capacity as determined by the sugar pine classification system inaugurated during 1946 and described in Part VIII of that year's annual report.

The Bureau operated 13 camps employing 639 men during 1947.

CAMPS ENGAGED IN COOPERATIVE RIBES ERADICATION DURING 1947

Forest	Location of Camp	Size of Camp	Operating Period
Lassen	Humbug	50	June 3 to Aug. 15
	Soda Springs	50	April 29 to Aug. 29
	Ramsey Bar	50	June 11 to Aug. 15
	Rag Dump	50	May 8 to Aug. 22
Latour State Forest	Whitmore*	30	April 16 to Sept. 9
Plumas	Walter's Mine	50	May 1 to Aug. 15
	Camel Peak	50	May 13 to Aug. 8
Eldorado	Snowline	16	April 23 to May 8
	Cold Spring	50	June 17 to Aug. 22
	Davis Cabin	50	May 1 to Aug. 30
	Dew Drop*	10	May 5 to Oct. 9
Stanislaus	Crane Meadows	50	April 29 to Sept. 15
Sierra	Miami	50	June 4 to Aug. 18

*State of California Division of Forestry's Youth Authority camps.

The cooperative project began early in April, when a training school was conducted in the techniques of using 2,4-D spray equipment. This school, held at the Soda Springs camp on the Lassen National Forest, was attended by representatives from the Park Service, Forest Service, and the Bureau. During the rest of April camps were put in shape and preparations were made for the season's work.

Ribes eradication was started the last few days in April. Some camps were not opened, however, until late June, due to the shortage of qualified supervisors. Several camps closed on August 8 and the last one finished field work on September 15.

Transient labor was secured through the State Employment Service for camps opening in May, and labor was recruited from colleges and universities throughout the country for camps opening in June. Replacements throughout June and early July were students and after that transients. First priority of assignment was given to all qualified veterans. In general the students were superior to the transients since turnover among them was less and production was greater. No inexperienced laborers under 17 years of age were employed.

Qualified camp superintendents were difficult to obtain, and several replacements were necessary before the summer was over. Foremen, checkers, and reconnaissance men were of higher quality than were available during the war years.

Wage rates for laborers were increased this year from \$0.882 per hour to \$0.970, and for crewleaders from \$0.970 to \$1.07 per hour. The rates for classified personnel remained unchanged from those of last season. The charge for subsistence was increased from \$1.56 to \$1.95 per day.

ACCOMPLISHMENTS

Lassen National Forest and Latour State Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s</u>		<u>W o r k e d</u>		<u>Man</u> <u>Days</u>	<u>Ribes</u> <u>Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>			
Humbug	-	2,865	2,865	1,594	263,187	
Soda Springs	2,173	2,413	4,586	2,365	183,198	
Rag Dump	3,854	-	3,854	2,120	95,978	
Ramsey Bar	3,140	-	3,140	1,943	214,370	
Whitmore (Latour State Forest)	2,244	-	2,244	1,271	82,489	
Spray Project (Soda Springs)	<u>157</u>	<u>-</u>	<u>157</u>	<u>110</u>	<u>63,751</u>	
Totals	11,568	5,278	16,846	9,403	902,973	

The Humbug camp continued with the reeradication of ribes from areas contiguous to those treated in 1946, which were treated initially in 1943 and 1944. Since the crews did not finish all the work needed, approximately 700 acres remain that should be worked in 1948.

The crews from Soda Springs completed the reeradication work on that unit and also finished the initial work on all recently cut-over lands that were ready for treatment. During May and June one power spray rig treated heavy concentrations of Ribes roezli in the vicinity of Colby Mountain.

A new camp was constructed at Ramsey Bar in the Flea Valley unit. The crews from this camp and those from Rag Dump continued the initial coverage of the young sugar pine stands in this area. The work was nearly completed on the southern half of the unit.

All camps used 2,4-D concentrates on troublesome bushes. Each crew on initial eradication was equipped with either a pulaski or a pair of pruning shears for decapitating ribes and an oil can of 2,4-D concentrate for treating the crown. This practice greatly decreased the time required for removal of large or rock-bound bushes.

Initial eradication of ribes was continued from the Whitmore camp which was operated by the California Youth Authority for forest work under the direction of the State Division of Forestry. Fifteen boys were assigned

to blister-rust-control work from the main camp from April 16 to the middle of September. An additional 15 boys were assigned from the Latour spike camp from June 15 to September 9. After the first of August little time was spent on ribes eradication because of numerous fire calls. The quality and quantity of the work done by the crews was poor, largely owing to the turnover in supervisory personnel; five different foremen were used at Whitmore during the year.

Plumas National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>		<u>Total</u>	<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>			
Camel Peak	795	-	795	1,697	379,502
Walter's Mine	1,043	766	1,809	2,040	281,908
Spray Project	<u>302</u>	<u>-</u>	<u>302</u>	<u>407</u>	<u>513,600</u>
Totals	2,140	766	2,906	4,144	1,175,010

These two camps continued work on the Feather River Pine Mills cut-over lands on the Cascade unit. Ribes populations were heavy and brush was dense on all areas worked. Dense ribes populations on 302 acres were sprayed with 2,4-D. The spray rigs were operated on a double shift basis from May 7 to July 10. Camp administration was complicated by this procedure, since extra cooks and flunkies were required to feed the early and late crews. The hand crews used 2,4-D concentrate on troublesome bushes.

A field office was established at Chico, California, from which the camps on the Lassen and Plumas Forest areas were administered. The Hall Scale project of the Bureau again made office space available for our use. A clerk and purchasing agent were employed to procure supplies for the camp and handle the office clerical work. The warehouse at the Chico Fair Grounds was retained and camp gear was stored there for the winter.

Eldorado National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>		<u>Total</u>	<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>			
Davis Cabin	344	3,943	4,287	2,682	225,048
Cold Springs	863	1,784	2,647	1,652	240,955
Dew Drop	844	-	844	667	121,724
Snowline	<u>480</u>	<u>-</u>	<u>480</u>	<u>122</u>	<u>10,689</u>
Totals	2,531	5,727	8,258	5,123	598,416

The Davis Cabin camp opened early in May and continued the initial and reeradication work on the Michigan-California Lumber Company lands in this area, which supports excellent sugar pine reproduction. All lands in need of working in this vicinity were covered during the season.

The Cold Spring camp completed the necessary reeradication work in that vicinity and finished all initial work which was scheduled ahead of the logging operations.

All work in these two camp areas was brought up to date this season and no work will be needed in 1948.

The Youth Authority camp at Dew Drop, under the supervision of the State Division of Forestry, continued work on the private lands in that area. Ten men were to be assigned daily to ribes eradication. However, since fire interruptions were numerous and the size of the crew assigned varied greatly from day to day, accomplishments were below expectations.

Early in the season a select crew worked from the Snowline camp on the initial working of the Institute of Forest Genetics Station near Placerville. Since many species of white pines and white pine hybrids are being grown experimentally here, their protection from blister rust is highly important in order to continue the studies now under way.

Stanislaus National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Crane Meadows	1,274	3,538	4,812	2,914	558,580

The Crane Meadows camp was manned with adult labor on April 29 and was in operation until September 15. The work was restricted to recently cut over lands of the West Side Lumber Company. All areas needing reeradication work were covered during the season. All initial work on private lands in this area has been completed.

Fire suppression activities were normal until August; thereafter sixty per cent of the time was spent on fire fighting.

In September and October two camps were constructed on the northern end of the forest, one in the Beaver Creek and the other in the Dorrington unit. In 1948 the crews from these two camps will perform reeradication work on state and private lands. Logging was started in these units during 1940, and since ribes have regenerated vigorously on many areas, this work is urgently needed.

Sierra National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>Acres Worked Reeradication</u>	<u>Man Days</u>	<u>Ribes Destroyed</u>
Miami	2,634	1,864	133,718

The Miami camp continued with the reeradication of ribes from areas contiguous to those worked last season. This old cut-over area supports good stands of sugar pine reproduction.

The camp was opened on June 4 and closed on August 18. The personnel was about one-half college students and one-half transient labor. Fire fighting caused little loss of time to the project.

Summary of Fire Fighting Activities

Interruptions of the project, due to the crews being used on fire suppression, were numerous during the latter part of the season. The man days lost to fire suppression are summarized in the following table.

SUMMARY OF MAN DAYS LOST TO FIRE SUPPRESSION
BY THE BUREAU CAMPS IN 1947

<u>Operation</u>	<u>8-Hour Man Days Spent on Fire Suppression</u>	<u>8-Hour Man Days Lost to Eradication Due to Fire</u>	<u>Man Days on Ribes Eradication</u>	<u>Man Days That Could Have Been Spent on Ribes Erad.</u>	<u>Per Cent of Man Days Avail. to Ribes Erad. Lost to Fire Suppression</u>
Lassen	651	201	9,403	9,604	2.1
Plumas	508	134	4,144	4,278	3.1
Eldorado	783	223	5,123	5,346	4.1
Stanislaus	798	377	2,914	3,291	11.4
Sierra	566	13	1,864	1,877	0.7
Totals	3,306	948	23,448	24,396	3.9

The loss in time to eradication would have been much greater had the Bureau's camps remained open until late September, as many fires occurred after the camps were closed.

Safety Report

During the field season of 1947 blister-rust-control employees of the cooperative project were involved in 72 accidents wherein some time from the job was lost, or medical expense to the government was incurred, or both. No fatal accidents occurred during the year and no time was lost because of infectious diseases. The number of accidents for each 1,000 men employed was smaller during 1947 than for 1946. Credit is due the field supervisory staff for achieving these results through a program of intensive training of new employees, closer supervision, and the application of preventive methods in the operation of the field work.

An analysis of injuries sustained is shown in the following table.

ANALYSIS OF INJURIES SUSTAINED BY FIELD EMPLOYEES
(Bureau Camps Only)

Type of Injury	Where Injury Occurred				Total No. Cases	Percentage of Total Number of Cases	Total Number Work Days Lost	Average No. Work Days Lost Per Accident
	Whse.	Camp	Woods	Fire				
Insect bites			1		1	1.4		
Poison oak		1	17	8	26	36.1	21	0.8
Thorns & punctures	1		2		3	4.2	1	0.3
Cuts & scratches	1	1	3		5	6.9	1	0.2
Blisters			1		1	1.4	2	2.0
Hernia		1	2		3	4.2	99	33.0
Burns		2		2	4	5.5	41	10.2
Fractures*		1		1	2	2.7	160	80.0
Strains & sprains			9	1	10	14.0	65	6.5
Eye injuries		1	5		6	8.3	3	0.5
Bruises		2	7		9	12.5	18	2.0
Respiratory infections			1		1	1.4	18	18.0
Infectious diseases								
Exposure & fever				1	1	1.4	4	4.0
Totals	2	9	48	13	72	100.0	433	6.0

*Includes one fracture caused by an automobile accident resulting in the loss of 150 work days.

Poison oak continues to be the most common type of disabling injury, accounting for 36.1 per cent of the total number of cases reported. In contrast with previous years, less than one-half the number of such cases reported during 1947 occurred on forest fires. This may be due to there being fewer fires during 1947 in the regions where poison oak is prevalent, and the fact that the ribes eradication work was performed in areas where the bushes were present.

Forest fires played a minor part in the accident rate during 1947; only 13 injuries of the 72 being attributed to fire fighting. This reduction, in comparison with previous years, may be attributed to three factors:

1. There were fewer calls on forest fires.
2. Older and more experienced men were employed.
3. Forest fires were less serious and of shorter duration.

COMPARISON OF THE NUMBER OF ACCIDENTS AND MAN DAYS LOST DURING
1944 TO 1947 INCLUSIVE

Year	Number Men Employed*	Number of Accidents	Number of Accidents Per 1,000 Men Employed	Total Paid Man-Days	Man-Days Lost Due to Injuries	Man-Days Lost Per 1,000 Paid Man Days
1944	660	48	73	23,000	191	8.3
1945	780	35	45	24,000	247	10.3
1946	1,535	96	63	46,000	83	1.8
1947	1,245	72	58	44,000	433	9.8
Total	4,220	251	59	137,000	954	7.0

*Includes all field overhead and technical employees and the staff of the Oakland warehouse.

A total of 433 work days were lost because of injuries. Two fracture cases, one of 150 work days and the other of 10 days, materially contributed to the total and increased the average number of man days lost per accident. Three hernia cases accounted for 99 lost man days.

A camp safety and health program aimed at reducing the frequency and severity of disabling injuries has been devised for 1948. Emphasis will be placed upon immunization and treatment of poison oak infection and the correct methods of performing the field work in order to minimize the number of falls and muscle strains commonly incurred.

Checking

The quality of the checking work was noticeably improved over that of the last few years. The checkers were older and were more interested in doing a good job. Replacements were available and it was no longer necessary to retain mediocre checkers. The accuracy of the work increased steadily as the men gained experience.

In general the regular checks were completed on all areas during the season. Some advance and post checks were not available early in the season, but were gradually caught up as the summer progressed. Advance and post checks were completed for some areas on which work is scheduled for 1948.

The results of the checking work are shown in table 5 immediately following this section of the report.

Summary of Ribes Eradication

The cooperative project in 1947 expended 23,448 man days destroying 3,368,697 ribes on 35,456 initial and rework acres.

The distribution by activity of the man days paid from the cooperative fund is shown in table 10 immediately following this section of the report.

The program in 1947 gave priority to recently logged lands and to areas where the rust is present and conditions are favorable for its intensification. All areas treated were appraised critically for the amount and quality of sugar pine they support, and only those areas supporting better than average sugar pine reproduction on the better sites were selected for treatment during the season.

The initial eradication of ribes has been done on 383,249 acres of the 876,735 state and privately owned acres within the control units of California and is now 43.7 per cent complete.

A detailed summary of the status of the project is presented in tables 1 to 10 immediately following this text.

RECOMMENDATIONS

Emphasis in 1948 should be placed on ribes removal from recently logged lands on which the sugar pine reproduction is adequate to perpetuate the stand. First priority should go to areas previously worked and on which ribes have regenerated; second priority should be given to the over-all coverage of cut-over lands previously spot worked. The use of 2,4-D should be expanded and all dense concentrations of ribes should be sprayed by means of power equipment. The use of 2,4-D concentrates on troublesome bushes should be expanded and made a general practice for all areas. Every effort must be made to increase the efficiency of the work through more careful selection of personnel, both supervisory and laborers, and the full use of new methods. Contracting ribes eradication should be started on suitable areas.

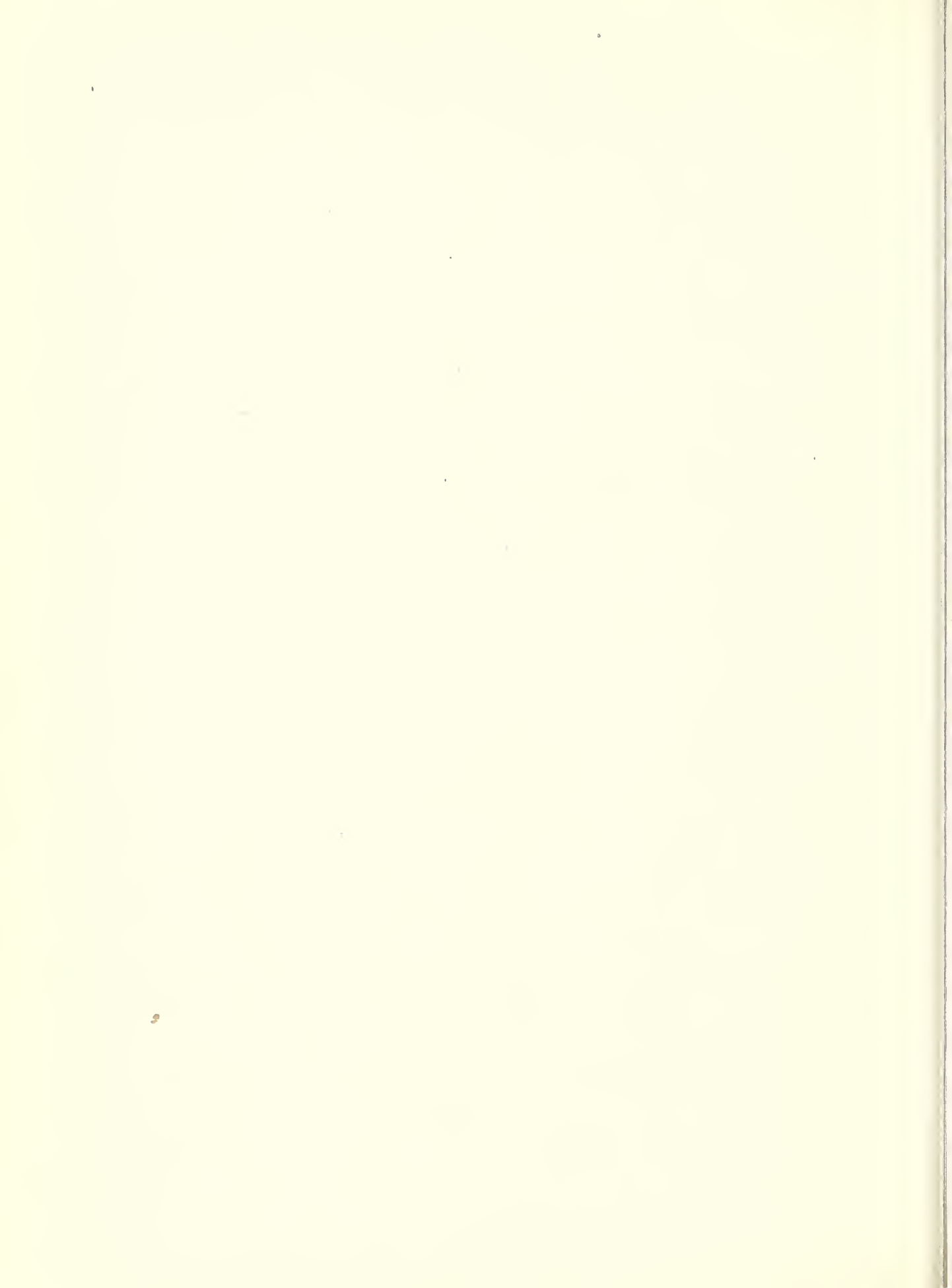


TABLE 1
SUMMARY OF COOPERATIVE RIBES ERADICATION IN CALIFORNIA - 1947

Control Operation	Acres			8-Hour Man Days	Ribes Eradicated	Per Acre Worked		Ownership Status									Acres Ribes-Free At Re-eradication
	Worked	Blocked Out	Total			8-Hour Man Days	Ribes	Acres Covered			8-Hour Man Days			Ribes Eradicated			
								Federal	Private	State	Federal	Private	State	Federal	Private	State	
Initial Work																	
Lassen National Forest	9,320	888	10,208	6,232	556,872	0.67	59	819	9,389		571	5,661		82,662	474,210		
Letour State Forest	726	634	1,360	584	17,929	0.80	24		590	770		169	415		4,491	13,438	
Plumas National Forest	2,140		2,140	1,435	1,085,365	1.60	507	267	1,873		425	3,010		102,607	982,758		
Kidorado National Forest	2,331	200	2,531	2,293	395,951	0.98	170	305	2,226		323	1,970		67,183	328,768		
Stanislaus National Forest	1,274		1,274	1,287	306,439	1.01	241	1,274			1,287			306,439			
Totals -	15,791	1,722	17,513	13,831	2,362,556	0.88	150	2,665	14,078	770	2,606	10,810	415	558,891	1,790,227	13,438	
Reeradication Work																	
Lassen National Forest	5,278		5,278	2,587	328,172	0.49	57	2,090	3,188		1,170	1,417		185,121	143,051		1,165
Plumas National Forest	766		766	709	89,645	0.33	117		766			709			89,645		
Kidorado National Forest	5,727		5,727	2,830	202,466	0.50	35	100	5,627		53	2,777		4,200	198,265		2,723
Stanislaus National Forest	3,538		3,538	1,627	252,141	0.46	71	1,635	1,903		669	968		112,376	139,765		1,485
Sierra National Forest	2,634		2,634	1,864	133,718	0.71	51	1,649	985		1,162	702		56,163	77,555		
Totals -	17,943		17,943	9,617	1,006,141	0.54	56	5,474	12,469		3,044	6,573		357,860	648,281		5,373
All Workings																	
Lassen National Forest	14,598	888	15,486	8,819	885,044	0.60	61	2,909	12,577		1,741	7,078		267,781	617,261		1,165
Letour State Forest	726	634	1,360	584	17,929	0.80	24		590	770		169	415		4,491	13,438	
Plumas National Forest	2,906		2,906	4,144	1,175,010	1.43	404	267	2,639		425	3,719		102,607	1,072,403		
Kidorado National Forest	8,058	200	8,258	5,123	598,416	0.64	74	405	7,853		376	4,747		71,383	527,033		2,723
Stanislaus National Forest	4,812		4,812	2,914	558,580	0.61	116	2,909	1,903		1,946	968		418,515	139,765		1,485
Sierra National Forest	2,634		2,634	1,864	133,718	0.71	51	1,649	985		1,162	702		56,163	77,555		
Totals -	33,734	1,722	35,456	23,448	3,362,697	0.69	100	8,139	26,547	770	5,650	17,383	415	916,751	2,438,508	13,438	5,373

TABLE 2
SUMMARY OF COOPERATIVE RIBES ERADICATION IN CALIFORNIA 1941-1947

Control Operation	Acres			8-Hour Man Days	Ribes Eradicated	Per Acre Worked		Ownership Status									Acres Ribes-Free At Re- eradication
	Worked	Blocked Out	Total			8-Hour Man Days	Ribes	Acres Covered			8-Hour Man Days			Ribes Eradicated			
								Federal	Private	State	Federal	Private	State	Federal	Private	State	
Initial Work																	
Lassen National Forest	30,540	2,061	32,601	26,223	4,064,474	0.86	133	6,676	25,925		5,137	21,086		1,059,593	3,004,881		
Letour State Forest	984	834	1,798	667	26,367	0.69	27		954	844		238	429		11,503	14,864	
Plumas National Forest	15,590	808	16,398	22,849	5,207,684	1.47	334	4,764	11,634		6,532	16,317		1,348,848	3,858,816		
Kidorado National Forest	16,068	630	16,698	14,727	2,252,659	0.92	140	1,998	14,700		1,963	12,784		361,943	1,890,716		
Stanislaus National Forest	1,849		1,849	1,622	544,735	0.88	295	1,544	305		1,387	235		492,335	52,400		
Totals -	65,011	4,333	69,344	66,088	12,095,899	1.02	186	14,982	53,518	844	15,019	50,640	429	3,262,719	8,818,316	14,864	
Reeradication Work																	
Lassen National Forest	23,439		23,439	9,619	1,214,511	0.41	52	3,873	19,566		2,157	7,462		283,367	931,144		4,790
Plumas National Forest	1,313		1,313	794	107,949	0.60	82		1,313			794			107,949		
Kidorado National Forest	22,123		22,123	11,029	1,110,192	0.50	50	4,252	16,768	1,103	2,274	8,372	383	294,897	796,589	18,706	11,306
Stanislaus National Forest	25,328		25,328	11,728	1,721,711	0.46	68	4,347	20,981		1,900	9,828		349,364	1,372,347		4,400
Calaveras Big Trees State Park	1,125		1,125	466	22,525	0.41	20		75	1,050		20	446		722	21,803	390
Sierra National Forest	5,011		5,011	3,943	373,257	0.79	74	2,019	2,992		1,698	2,245		121,580	251,677		270
Totals -	78,239		78,239	37,579	4,550,145	0.48	58	14,491	61,695	2,153	8,029	28,721	829	1,049,208	3,460,428	40,509	21,156
All Workings																	
Lassen National Forest	53,979	2,061	56,040	35,842	5,278,985	0.66	98	10,549	45,491		7,294	28,548		1,342,960	3,336,925		4,790
Letour State Forest	984	834	1,798	667	26,367	0.69	27		954	844		238	429		11,503	14,864	
Plumas National Forest	15,903	808	17,711	23,843	5,315,613	1.40	314	4,764	12,947		6,532	17,111		1,348,848	3,366,765		
Kidorado National Forest	38,193	630	38,823	25,756	3,362,851	0.67	88	6,250	31,468	1,103	4,237	21,136	383	656,840	2,687,305	18,706	11,306
Stanislaus National Forest	27,177		27,177	13,350	2,266,446	0.49	83	5,891	21,286		3,287	10,063		841,699	1,424,747		4,400
Calaveras Big Trees State Park	1,125		1,125	466	22,525	0.41	20		75	1,050		20	446		722	21,803	390
Sierra National Forest	5,011		5,011	3,943	373,257	0.79	74	2,019	2,992		1,698	2,245		121,580	251,677		270
Totals -	143,350	4,333	147,683	103,667	16,646,044	0.72	116	29,473	115,213	2,997	23,048	79,361	1,258	4,311,927	12,278,744	55,373	21,156



TABLE 3

SUMMARY OF CHEMICAL SPRAY WORK ON THE COOPERATIVE PROJECT
IN THE PACIFIC COAST REGION - 1947

Operation	Acres Covered	Man Days			Ribes Sprayed	Gal. of Spray Used	Per Acre			Ribes Per Gal.
		*Eff- ective	**Super- visory	Total			Eff. Man Days	Gal. Spray	Ribes	
Plumas	302	407	50	457	513,600	97,950	1.35	324	1,701	5.24
Lassen	157	110	30	140	63,751	22,275	0.70	142	406	2.86
Totals	459	517	80	597	577,351	120,225	1.13	262	1,258	4.80

*Nozzle and operator man days

**Principally the foreman's time

TABLE 4

CUMULATIVE SUMMARY OF CHEMICAL SPRAY WORK ON THE COOPERATIVE PROJECT
IN THE PACIFIC COAST REGION 1946-1947

Operation	Acres Covered	Man Days			Ribes Sprayed	Gal. of Spray Used	Per Acre			Ribes Per Gal.
		*Eff.ective	**Super-visor	Total			Eff. Man Days	Gal. Spray	Ribes	
Plumas	349	473	59	532	580,407	108,350	1.36	310	1,663	5.36
Lassen	157	110	30	140	63,751	22,275	0.70	142	406	2.86
Stanislaus	281	154	24	178	204,591	30,550	0.55	109	728	6.70
Totals	787	737	113	850	848,749	161,175	0.94	205	1,079	5.27

*Nozzle and operator man days

**Principally the foreman's time

TABLE 5

SUMMARY OF CHECKING ON THE COOPERATIVE PROJECT - 1947

Operation	Regular Check			Advance Check			Post Check			All Checks		
	Acres Covered By Final Check	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days
Lassen	12,306	5.0	248.1	18,834	3.6	333.6	6,432	3.4	98.8	37,572	4.0	680.5
Plumas	2,870	3.4	49.9	2,414	2.7	29.9	1,770	2.7	17.6	7,054	3.0	97.4
Eldorado	6,959	4.9	154.9	640	2.5	8.2	800	2.5	34.0	8,392	4.5	197.1
Stanislaus	3,116	2.9	51.1	640	1.3	5.0	3,680	4.3	57.3	7,436	3.5	113.4
Sierra	2,370	4.3	127.0	320	2.2	4.5	1,920	1.7	51.4	4,610	3.1	182.9
Totals	27,621	4.5	631.0	22,848	3.4	381.2	14,602	3.3	259.1	65,071	3.8	1,271.3



TABLE 6

SUMMARY OF RIBES ELIMINATION BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE 1925-1947

Control Operation	Acres		Per Acre Worked	Acres Covered				Ownership				Status				Ribes Eliminated				Acres Ribes-Free At Re-eradication	
				Federal				Federal				Federal				Federal					
	Worked	Blocked Out		Total	6-Hour Man Days	Ribes Eradicated	6-Hour Man Days	National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total		
																					Initial Work
California:																					
Kassen N. F.	41,751	11,410	53,161	31,117	5,087,340	0.75	122	11,336	41,825	6,362	28,755	6,362	28,755	21	1,318	10,930,704	5,064,567	3,260	185,001		
Natur State Forest	964	834	1,798	667	26,367	0.69	27	26,317	67,020	18,686	43,123	18,686	43,123	238	429	4,179,109	10,436,049	11,503	14,864		
Pumas N. F.	76,636	16,801	93,437	62,430	14,619,718	0.81	191	26,377	89,460	15,586	52,790	15,586	52,790	21	21	4,006,537	13,101,089	310,691	4,620		
El Dorado N. F.	91,773	26,232	118,005	70,010	17,416,517	0.75	186	27,943	89,460	2,602	15,586	2,602	15,586	1,634	1,634	4,006,537	13,101,089	310,691	4,620		
Siemans N. F.	125,209	9,231	134,440	60,313	19,967,220	0.48	159	26,959	107,074	407	10,977	407	10,977	1,293	1,293	2,813,273	17,137,179	16,768			
Calaveras Big Trees State Park	1,668	1,339	3,007	1,668	186,261	0.72	101			120	1,748			21	21	10,930,704	5,064,567	3,260	185,001		
Sierra N. F.	50,418	76,090	126,508	50,418	15,995,271	1.51	317	35,638	124,780	54,059	22,031	54,059	22,031			10,930,704	5,064,567	3,260	185,001		
Subtotal	390,619	64,508	455,127	301,966	73,302,754	0.77	188	128,253	321,233	5,641	105,670	5,641	105,670	3,531	3,531	23,282,406	49,516,204	532,144			
Oregon:																					
Rogue River N. F.	70,413	70,039	140,452	46,650	15,798,559	0.66	224	65,155	69,903	38,574	1,154	39,728	6,902	43	43	14,943,637	136,371	1,108,551	8,328		
Siskiyou N. F.	20,918	36,926	57,844	10,769	761,516	0.52	36	6,682	31,343	300	1,646	5,566	5,180	43	43	269,282	174,417	133,610	2,472		
Elmest N. F.	4,275	293	4,568	6,469	533,429	1.52	125	3,739	829	4,607	1,882	4,607	1,882	174	174	419,719					
Imreay Smitation	466	304	770	352	5,019	0.72	10			418	412										
Subtotal	96,092	107,602	203,694	64,260	17,098,623	0.67	176	75,556	102,493	712	44,827	5,074	49,901	14,142	217	15,008,221	370,786	1,708,814	10,800		
Totals	486,711	172,110	658,821	366,226	90,401,377	0.75	186	203,809	423,726	6,353	150,497	5,074	155,571	206,997	3,748	38,260,627	370,786	3,415	51,227,018		
Reeradication																					
California:																					
Kassen N. F.	26,299	26,299	52,598	9,942	1,226,109	0.39	48	4,590	20,709	2,271	1,671	2,271	1,671	20	20	287,815	938,294		9,970		
Pumas N. F.	20,662	11,778	32,440	11,778	1,400,914	0.56	67	6,169	14,443	3,094	8,684	3,094	8,684	343	343	377,216	1,023,698		5,746		
El Dorado N. F.	45,164	24,784	69,948	31,417	2,307,110	0.55	51	10,945	33,116	1,103	5,798	18,683	5,798	555	555	636,667	1,654,717		12,081		
Siemans N. F.	76,211	31,417	107,628	31,417	6,779,140	0.45	87	23,267	48,944	12,507	21,110	12,507	21,110			3,236,665	3,542,477		11,218		
Calaveras Big Trees State Park	1,340	1,340	2,680	492	27,317	0.37	20	2,904	3,292	75	1,265	2,701	2,663			285,577	311,282		390		
Sierra N. F.	6,196	5,364	11,560	5,364	936,639	0.87	96	54,075	120,629	26,171	58,751	26,171	58,751	855	855	4,823,536	7,468,190		45,301		
Subtotal	177,072	85,777	262,849	85,777	12,357,425	0.48	70	20,980	12,192	2,368	26,171	2,368	26,171			766,931	1,725,531		270		
Oregon:																					
Rogue River N. F.	33,142	7,517	40,659	7,517	939,462	0.23	28	20,980	12,192	5,664	1,853	5,664	1,853			766,931	1,725,531		270		
Totals	210,214	93,294	303,508	93,294	13,276,891	0.44	63	75,025	132,621	2,368	31,635	2,368	31,635			5,590,669	7,468,190		45,301		
All Workings																					
California:																					
Kassen N. F.	67,090	11,410	78,500	41,059	6,313,449	0.61	94	15,926	62,534	8,633	32,426	8,633	32,426			1,610,596	4,702,851		9,970		
Natur State Forest	964	834	1,798	667	26,367	0.69	27	26,317	67,020	18,686	43,123	18,686	43,123			4,556,325	11,459,747		5,746		
Pumas N. F.	97,498	16,801	114,299	74,206	16,020,992	0.76	164	32,746	81,513	21,780	52,407	21,780	52,407	21	21	4,556,325	11,459,747		5,746		
El Dorado N. F.	138,937	26,232	165,169	94,794	19,725,627	0.68	142	38,868	122,576	3,705	21,394	3,705	21,394	2,017	2,017	4,643,204	14,752,826		12,081		
Siemans N. F.	203,420	9,231	212,651	93,730	26,746,360	0.46	131	56,226	156,018	407	23,264	407	23,264	189	189	6,049,936	20,679,656		16,768		
Calaveras Big Trees State Park	3,208	3,208	6,416	1,631	215,578	0.57	67			195	1,013			41	41	11,216,281	5,375,823		390		
Sierra N. F.	56,614	81,464	138,078	56,614	16,592,110	1.44	293	38,542	18,072	56,760	28,694	56,760	28,694	11	11	11,216,281	5,375,823		390		
Subtotal	567,591	64,508	632,099	367,743	85,040,183	0.65	151	182,328	441,862	8,009	25,516	8,009	25,516			28,076,344	56,966,394		39,275		
Oregon:																					
Rogue River N. F.	101,555	70,039	171,594	54,147	16,739,021	0.52	162	65,155	69,903	5,394	1,154	49,392	6,755			15,260,568	136,371		8,191		
Siskiyou N. F.	20,918	36,926	57,844	10,769	761,516	0.52	36	6,682	31,343	300	1,646	5,566	5,180	43	43	269,282	174,417		8,328		
Elmest N. F.	4,275	293	4,568	6,469	533,429	1.52	125	3,739	829	4,607	1,882	4,607	1,882	174	174	419,719			2,472		
Imreay Smitation	466	304	770	352	5,019	0.72	10			412	412										
Subtotal	123,274	107,602	230,876	71,777	18,038,085	0.56	149	96,506	124,439	50,491	5,074	59,565	15,995	217	217	15,775,152	370,786		10,800		
Totals	690,865	172,110	862,975	489,520	103,078,268	0.66	149	178,834	241,933	303,767	556,547	8,721	182,332	4,603	4,603	43,851,496	370,786		58,671		

*Includes 7,516 acres, 3,905 man days, and 1,217,951 ribes on lands worked by the Bureau of Entomology and Plant Quarantine now in Yosemite National Park.

**Includes 480 acres, 326 man days, and 298,657 ribes on land worked by the Bureau of Entomology and Plant Quarantine now in Yosemite National Park.



TABLE 7

ACREAGE OF STATE AND PRIVATE LANDS WORKED BY ALL AGENCIES
IN THE PACIFIC COAST REGION - 1947

Control Operation	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
Klamath	2,363	525	-	2,888
Lassen	9,389	2,216	972	12,577
Latour State Forest	1,360	-	-	1,360
Plumas	3,679	1,965	5,656	11,300
Eldorado	3,073	3,422	2,818	9,313
Stanislaus	30	973	1,345	2,348
Sierra	-	-	1,505	1,505
California Totals	19,894	9,101	12,296	41,291
Rogue River	-	-	593	593
Siskiyou	4,864	4,995	22	9,881
Klamath	-	377	-	377
Oregon Totals	4,864	5,372	615	10,851
Totals	24,758	14,473	12,911	52,142

TABLE 8

ACREAGE OF STATE AND PRIVATE LANDS WORKED BY ALL AGENCIES
IN THE PACIFIC COAST REGION AS OF DECEMBER 31, 1947

Control Operation	First Working Acres	Second Working Acres	Other Workings Acres	Total Workings Acres
Klamath	21,393	6,721	170	28,284
Lassen	58,196	17,138	7,728	83,062
Latour State Forest	1,798	-	-	1,798
Lassen Volcanic	140	15	-	155
Plumas	79,877	35,905	18,936	134,718
Eldorado	97,353	47,076	13,167	157,596
Stanislaus	106,468	54,134	14,665	175,267
Calaveras Big Trees State Park	1,868	1,185	155	3,208
Sierra	16,156	6,830	4,277	27,263
California Totals	383,249	169,004	59,098	611,351
Rogue River	73,125	12,746	1,343	87,214
Siskiyou	39,735	7,931	870	48,536
Klamath	829	377	-	1,206
Clark McNary Nursery	830	-	-	830
McKinley Nursery	40	-	-	40
Oregon Totals	114,559	21,054	2,213	137,826
Totals	497,808	190,058	61,311	749,177

TABLE 9

STATUS OF COOPERATIVE FUNDS FOR RIBES ERADICATION ON STATE AND PRIVATE LANDS
IN CALIFORNIA - JULY 1, 1941 TO DECEMBER 31, 1947

Cooperative Funds	Accumulative Cooperative Contributions and Federal Appropriations 7/1/41-5/30/48	Accumulative Expenditures 7/1/41-12/31/46	Expenditures Calendar Year 1947	Available Balances as of 1/1/48
State and Private Cash Contributions:				
State of California	\$ 425,000	\$ 224,319	\$ 140,685	\$59,996
Diamond Match Company	12,000	8,232	3,162	606
Michigan-California Lumber Company	12,000	7,946	-	4,054
Red River Lumber Company*	4,000	4,000	-	-
Winton Lumber Company	3,000	1,000	-	2,000
Total	\$ 456,000	\$ 245,497	\$ 143,847	\$66,656
Federal Allotments (Project 3103.14)				
1942 Fiscal Year	\$ 14,625	\$ 14,612	-	-
1943 Fiscal Year	71,770	71,378	-	-
1944 Fiscal Year	86,195	86,083	-	-
1945 Fiscal Year	85,040	84,997	-	-
1946 Fiscal Year	271,125	270,544	-	-
1947 Fiscal Year	563,000	309,866	251,617	-
1948 Fiscal Year	130,000	-	109,272	20,728
Total (Project 3103.14)	\$1,221,755	\$ 837,480	\$360,889	\$20,728
Grand Total	\$1,677,755	\$1,082,977	\$504,736	\$87,384

*Red River Lumber Company contributed only for 1943 and 1944 fiscal years.

NOTE: Expenditures in the amount of \$44,015.21 were made during 1947 for emergency fire suppression at the call of the State of California, Division of Forestry, and the U. S. Forest Service. Reimbursements were made by these agencies to the Bureau blister-rust-control funds in the amount of \$10,861.12 from the State of California and \$33,154.09 from the Forest Service. These amounts were credited back to the funds from which expended and are a part of the balances shown available for expenditure.

TABLE 10

DISTRIBUTION BY ACTIVITY OF MAN DAYS PAID FROM LETTER OF AUTHORIZATION FUNDS
ON THE COOPERATIVE PROJECT

Item	Activity																
	Eradication			Checking			Re-connaissance			Scouting and Disease Surveys			Equipment Maintenance & Repair			Totals	
	Man Days	Per Cent		Man Days	Per Cent		Man Days	Per Cent		Man Days	Per Cent		Man Days	Per Cent		Man Days	Per Cent
Supervision	3,140	9.33		51	3.58		30	1.95		10	1.52		-	-		3,231	8.29
Subsistence	4,264	12.67		-	-		127	8.24		57	8.68		-	-		4,448	11.42
Digging Ribes* Camp Maintenance and Construction	21,510	63.93		1,220	85.61		1,231	79.83		559	85.08		1,685	97.62		26,205	67.21
	1,861	5.54		-	-		43	2.79		14	2.13		-	-		1,918	4.93
Rain	786	2.34		-	-		6	0.39		-	-		-	-		792	1.98
Search (lost child)	181	0.54		-	-		-	-		-	-		-	-		181	0.46
Paid Holiday	772	2.29		41	2.88		45	2.92		12	1.83		41	2.38		911	2.35
Paid Leave	246	0.73		9	0.63		5	0.32		-	-		-	-		260	0.67
General Facilitating	884	2.63		104	7.30		55	3.56		5	0.76		-	-		1,048	2.69
Totals	33,644	100.00		1,425	100.00		1,542	100.00		657	100.00		1,726	100.00		38,994	100.00
Lump Sum Payment															**	3,328	

*Synonymous with "effective man days".

**Purposely excluded from total in line above.

PART IV

BLISTER RUST CONTROL BY THE FOREST SERVICE

Financial Project BLR-4

By

Conrad P. Wessela, Forester

PURPOSE

The purpose of this project is to protect stands of white pine growing on selected areas of national forest land from damage caused by the disease known as white pine blister rust.

COOPERATION

Cooperative agreements in effect since 1937 between Regions 5 and 6 of the Forest Service and the Bureau of Entomology and Plant Quarantine for the conduct of blister rust control by the two agencies were continued in effect through 1947.

The Regional Office of R-5 continued their agreement with the State Board of Corrections of California on the use of inmates from State Penitentiaries for doing blister rust control and other forest improvement work.

LOCATION AND ORGANIZATION OF WORK

The Forest Service operated four camps in Oregon and fifteen in California. The laborers of three California camps were inmates from San Quentin and Folsom Penitentiaries; one camp in Oregon was made up of teen-age high school students. In all other camps the laborers in both states were over eighteen years of age, of which about 45 per cent were college students. The remainder were largely transients. Collectively the quality of labor was better than that of labor employed in any other year since 1942, and temporary supervisors were more plentiful and more able. Nevertheless, securing enough able and competent temporary supervisors for all camps was still the number one recruitment problem; several camps were operated with mediocre superintendents and foremen.

The following tabulation gives the location, size, type of labor employed, and the operating period for all Forest Service camps in Oregon and California.

DISTRIBUTION OF FOREST SERVICE CAMPS

National Forest	Location of Camp	Size of Camp	Type of Labor	Operating Period
Oregon				
Rogue River	Foster Creek	30	Regular	June 16 to Sept. 15
	Jim Creek	30	Regular	May 6 to Sept. 5
Umpqua	Coffee Pot	20	H.S. Boys	June 18 to Aug. 30
Klamath	Cottonwood	50	Regular	June 16 to Sept. 6
California				
Klamath	Doggett Creek	50	Prison	May 16 to Oct. 6
Plumas	Estray Creek	25	Regular	May 5 to Oct. 6
	Merrimac and Canyon Dam	40	Regular	May 6 to Sept. 5
	Granite Basin	50	Prison	May 13 to Oct. 14
	Meadow Valley	20	Regular	June 16 to Sept. 11
	Mooreville Ridge	50	Prison	May 9 to Oct. 14
	Big Meadow	50	Regular	June 18 to Sept. 26
Eldorado	Caldor	50	Regular	May 13 to Sept. 19
	China Flat	30	Regular	June 10 to Sept. 2
	Bumblebee	50	Regular	May 10 to Sept. 18
Stanislaus	Camp 17	50	Regular	May 10 to Aug. 30
	Thompson Meadows	50	Regular	June 16 to Aug. 30
Sierra	Gertrude Creek	50	Regular	June 5 to Oct. 24
	Soquel	50	Regular	June 24 to Aug. 27
	Summit	50	Regular	June 6 to Sept. 9

Under the technical direction of the Bureau four truck-mounted power-spray units were placed in operation by the Forest Service during the season of 1947. These units were used to apply the 2,4-D ribicide to heavy concentrations of ribes on Forest Service lands. Two of the spray outfits were operated on the Sierra National Forest and one each on the Stanislaus and Eldorado National Forests. Since the effectiveness of 2,4-D as a ribicide drops off sharply toward the end of the active growing season for ribes, spray work was discontinued after the second week in July. Some of the power-spray units were double shifted in order to get the maximum use of the equipment before the active growing season closed.

The results of the Forest Service spray project are shown in table 3 following this text.

As a result of experiments made in 1946 by the Rogue River National Forest, a sizeable contract project for ribes eradication work (using the hand grubbing method as distinguished from the chemical spray method) was started and maintained in R-6 throughout the 1947 field season. In R-5 small experimental contracts were awarded on the Klamath and Plumas National Forests. In both Regions thirty separate contracts for the eradication of ribes from a total of 5,487 acres were awarded by the Forest Service and completed to prescribed standards by contractors. Twenty-three of these contracts, totaling 4,725 acres, were in R-6, and seven, totaling 762 acres, were in R-5. The average bid price per acre for both Regions was \$5.99; \$5.87 per acre in R-6 and \$6.72 per acre in

R-5. On the Rogue River National Forest where 82 per cent of all the Forest Service contracting program was undertaken, contract costs averaged \$6.91 per acre; \$5.52 average bid price per acre and \$1.39 per acre for checking, inspections, administration, etc. The cost of the manual grubbing method using hired day labor, based on the operation of two thirty-man camps, was \$11.37 per acre. Since the areas worked by contractors and the areas worked by hired labor were similar in topography, ribes population, and ground cover, contracting was done \$4.46 per acre cheaper than hired labor coverage. In addition cleaner work was obtained by the contractor. On contracted areas, regular checks show that an average of 1.5 feet of live stem per acre remain as compared to 6.1 feet of live stem per acre remaining on the areas worked by crews of hired day laborers. Contracting ribes eradication work will undoubtedly assume a place of increasing importance in the blister-rust-control program.

The tables appended to this report summarize the contract work by Region and National Forest.

ACCOMPLISHMENTS

Umpqua National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>Acres Worked Initial</u>	<u>Man Days</u>	<u>Ribes Destroyed</u>
Coffee Pot	1,909	748	12,545
Contract Project	<u>413</u>	<u>180</u>	<u>4,739</u>
Totals	2,322	928	17,344

For the first time ribes eradication work was started on the Umpqua National Forest in the south Umpqua District. One camp of eighteen boys of high school age was located in the buildings of the old Coffee Pot CCC side camp for work in the Coffee Pot unit. Also two contracts were completed by private individuals in the same unit.

Since there is a total of 6,080 acres in the Coffee Pot unit, 3,758 remain to be treated initially, of which approximately 3,080 acres are naturally free of ribes as determined by advance check. This leaves but 678 acres remaining for either camp work or contracting. Since acres covered by camp laborers and contractors in 1947 amounted to 1,463 acres, exclusive of acreage which was naturally ribes free, the initial eradication of ribes on this unit is about two-thirds completed. Because of comparatively severe rust damage in portions of the unit and the presence of rust over the whole of it, completion of the initial ribes eradication work in 1948 is imperative to prevent further losses of sugar pine.

Siskiyou National Forest

Ribes Eradication in 1947

	<u>Acres Worked</u> <u>Reeradication</u>	<u>Man</u> <u>Days</u>	<u>Ribes</u> <u>Destroyed</u>
Contract Project	431	176	3,755

Control work by the Forest Service on the Siskiyou National Forest was confined to the Bolan Lake unit. No camp was established since all necessary reeradication work was contracted to private individuals in four separate contracts at an average bid price of \$10.33 per acre.

All needed second working has now been completed on the Bolan Lake unit, and no further treatment will be required until 1950 when a systematic five per cent check should be made of the entire unit. This check will determine the areas in need of maintenance work in 1951.

Rogue River National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man</u> <u>Days</u>	<u>Ribes</u> <u>Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Foster Creek	30	2,091	2,121	976	36,779
Jim Creek	134	2,730	2,864	1,142	38,083
Contract Project	-	3,881	3,881	805	65,373
Totals	164	8,702	8,866	2,923	140,235

Initial work on the Upper Rogue unit, except for pending minor adjustments in control unit boundaries, was completed in 1939. Since 1942 a program of ribes reeradication has been in effect. During 1947 good progress was made toward the completion of a thorough reeradication job on all cut-over areas where ribes regeneration was endangering young sugar pine stands. About 2,000 acres of cut-over sugar pine type and certain portions of the Foster Creek drainage remain to be treated early in 1948. In addition there are some 20,000 acres within the white pine stands north of Union Creek in need of immediate reeradication work. Contracting this job to the maximum extent possible is recommended as the cheapest and most effective means of establishing the control desired.

Klamath National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man</u> <u>Days</u>	<u>Ribes</u> <u>Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Cottonwood	274	1,255	1,529	2,167	37,794
Doggett Creek	2,583	537	3,120	3,144	251,800
Contract Project	202	-	202	37	13,419
Totals	3,059	1,792	4,851	5,348	303,013

Two camps were established and maintained on the Klamath during 1947. One was a 50-man unit of state prisoners and the other a unit of the same size composed of college students and transient laborers.

The prison camp was located in the Cinnabar Springs unit at the Doggett Creek camp site which was developed and used in 1946. Except for a small amount of reeradication work on areas covered in 1946 which did not meet control standards, this camp continued with initial work from May 6 to October 6. Approximately 800 acres of initial work remain to be done in the unit. To save the cost of establishing a camp for treating this acreage, contracting it during the next two years is recommended.

Two contracts in the Cinnabar Springs unit totaling 202 acres were completed for an average bid price of \$5.25 per acre. This represented the first attempt at contracting on the Klamath and results were most satisfactory.

The other camp was operated from the Cottonwood camp site in the Beaver Creek unit. It got off to a late start in June followed by several changes in camp superintendents during the season, and as a result accomplishments were considerably below those anticipated and required. Enough reeradication work remains to be done in the Beaver Creek unit to occupy two camps plus a contract project next year.

Plumas National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Merrimac-Canyon Dam	-	6,189	6,189	2,102	324,922
Estray Creek	-	4,101	4,101	1,924	220,853
Meadow Valley	-	1,940	1,940	1,078	151,710
Mooreville Ridge	3,026	-	3,026	3,736	467,269
Granite Basin	1,169	1,550	2,719	3,297	242,201
Contract Project	-	560	560	368	28,906
Totals	4,195	14,340	18,535	12,505	1,435,861

Five camps were operated by the Forest Service. The Mooreville Ridge camp continued the initial coverage of lands supporting excellent sugar pine stands. Those parts of the Lost Creek burn within the control unit were finished with the exception of about 300 acres which were reserved to be sprayed with 2,4-D. Extremely heavy ribes concentrations within the burn created difficult eradication problems. In addition to the burned area considerable mature timber areas were also treated.

The Granite Basin camp finished the reeradication job on this unit and completed also 1,169 acres of initial eradication on old cut-over land. All cut-over in this unit has now been covered and no further work should be required for several years. The area was brushy and presented difficult working conditions.

The Meadow Valley camp was operated as a joint project camp with blister rust, pruning, and slash disposal as the work projects. Twenty-five men were assigned to blister rust control work. All work was done on areas previously treated, but which had been recently cut-over, on which ribes regeneration had been prolific. No unusual problems were encountered.

The Estray Creek camp eradicated ribes from the eastern end of the Thompson Creek unit. All work was confined to reeradication on cut-over areas.

The Merrimac camp removed ribes from the Merrimac unit which was initially worked in 1942. Ribes regeneration was spotty, being vigorous on small areas only. Much of the unit was cut-over a number of years ago, and the ribes come-back has been light since initial workings. No further work should be required for several seasons. The camp finished the area on June 18 and then moved to Canyon Dam on the northern end of the forest.

The Canyon Dam camp did ribes reeradication work on recently cut-over areas on which ribes had regenerated vigorously. The control program was complicated because the work areas were widely scattered.

Ribes removal by contract was begun after July 1 in Meadow Valley and in the Thompson Creek unit. In all, five contracts were let for a total of 560 acres at an average bid price of \$7.25 per acre.

Fire interruptions were less than normal for the Plumas. Although each camp lost time because of fire suppression work, no camp was badly disrupted.

Eldorado National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Caldor	910	2,710	3,620	2,297	218,758
China Flat	441	708	1,149	1,202	317,996
Big Meadows	1,562	-	1,562	1,863	321,138
Spray Project	385	-	385	173	226,500
Totals	3,298	3,418	6,716	5,535	1,084,392

The Forest Service operated three blister-rust-control camps during 1947. The camp at Big Meadows was engaged entirely on initial eradication work; the Caldor camp and the China Flat camp worked principally on reeradication.

This year the first 2,4-D chemical spray treatment of ribes on the Eldorado was performed on the Caldor unit. The six-man crew treated 226,500 ribes on 385 acres during June and July.

The China Flat camp was manned with forestry students recruited from schools in the eastern states. Their work was above average and there was no labor turnover. The forest work experience gained by these students was augmented by frequent calls to fight forest fires.

The Big Meadows crew worked on initial eradication in the Long Canyon unit, which is covered entirely with virgin timber and supports heavy concentrations of ribes. Blister rust infection has gained a foothold in this unit, from which many cankers were removed during the season.

Stanislaus National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Bumblebee	-	2,870	2,870	1,654	192,926
Camp 17	-	1,840	1,840	1,348	252,830
Thompson Meadows	-	1,095	1,095	1,156	140,460
Spray Project	<u>309</u>	<u>-</u>	<u>309</u>	<u>199</u>	<u>455,200</u>
Totals	309	5,805	6,114	4,357	1,041,416

One chemical spray unit and three fifty-man camps were operated by the Forest Service on the Stanislaus National Forest during 1947. The camps were located at Bumblebee, Thompson Meadows, and Camp 17. The spray crew worked out of the Bureau's camp located at Crane Meadows. The Bumblebee and Camp 17 camps started early in May with transient labor, which was of such poor quality that students replaced them as soon as they became available. Thompson Meadows was manned with college and high school students. The student labor this year was of much better quality than that of previous years.

The chemical spray crew performed initial eradication work on cut-over areas in the Jawbone unit. Only those areas supporting the heaviest concentrations of ribes were treated.

The crews from the three camps were employed on reeradication work on cut-over areas. To complete the scheduled reeradication program camps will be needed on all three areas again next year.

Fire fighting demands on the camps during August were so great that this month was practically a complete loss to the blister-rust-control project.

Gerald Hill was assigned as blister-rust-control staff man on the Stanislaus during 1947 and was responsible for the administration of the Forest Service camps.

Sierra National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Summit	-	1,430	1,430	1,460	93,955
Soquel	-	2,274	2,274	1,149	147,682
Gertrude Creek	785	-	785	1,368	286,951
Spray Project	<u>283</u>	<u>-</u>	<u>283</u>	<u>351</u>	<u>492,800</u>
Totals	1,068	3,704	4,772	4,328	1,021,388

The Forest Service operated three camps of about fifty men each. Early in May the Gertrude Creek camp was built to begin work in the Whiskey Creek unit, an area of outstanding young-growth sugar pine. During late June and early July 283 acres were treated with 2,4-D chemical applied by two power spray units. Except for a short period when all available men were assigned to keep these spray outfits working a double shift, hand eradication continued from May to late October. Ribes and ground cover density varied greatly over that part of the unit covered. Some small areas were almost ribes free, and others supported heavy concentrations of ribes requiring chemical spray work.

In early June the Summit camp opened to continue reeradication work on the Chowchilla Mountain unit. Continued vigorous regeneration of ribes in some parts of this unit has required operation of the Summit camp almost yearly since the initial work was completed in the years 1935 to 1938. Furthermore, it will have to be operated the next two seasons before ribes growth is suppressed in all parts of the unit to the point where a year or two may elapse before further treatment is necessary.

Reeradication work in the Soquel unit was brought up to date this season through operation of the Soquel camp during July and August. No reeradication work will be necessary here before 1949, but additional initial work should be undertaken as soon as funds are available.

About half the labor for the Soquel camp was from eastern forestry schools. The remainder of the laborers employed in all camps was obtained from transient labor sources in Madera and Fresno.

Present plans for 1948 are to continue reeradication work from the Summit camp, to continue initial work from the Gertrude Creek camp, and to establish a new camp on Whiskey Creek. The site for this new camp has been prepared and roads were opened for the use of spray equipment. A higher proportion of chemical spray work to hand work will be necessary in the Whiskey Creek area than in the Gertrude Creek area.

Summary of Fire Fighting Activities

The demands on Forest Service blister-rust crews for fire suppression work were slightly less than those in 1946. In Oregon they were unusually light because of continued intermittent rains throughout the fire season. Time spent on fires in California amounted to a loss of 5,548 eight-hour man days to the eradication project, or stated in another way 13.3 per cent of total man days available for the season were utilized fighting fire.

The following tabulation summarizes the man days lost to the eradication project as a result of fire suppression work.

SUMMARY OF MAN DAYS LOST TO FIRE SUPPRESSION
BY FOREST SERVICE CAMPS IN 1947

Operation	8-Hour Man Days Lost to Eradication Due to Fire	Man Days on Ribes Eradication	Man Days That Could Have Been Spent on Ribes Erad.	Per Cent of Man Days Avail. to Ribes Erad. Lost to Fire Suppression
Umpqua	20	928	948	2.1
Rogue	46	2,923	2,969	1.5
Siskiyou	-	176	176	0.0
Klamath	1,071	5,348	6,419	16.7
Plumas	1,643	12,505	14,148	11.6
Eldorado	953	5,535	6,488	14.7
Stanislaus	1,030	4,357	5,387	19.1
Sierra	785	4,270	5,055	15.5
Totals	5,548	36,042	41,590	13.3

Checking

Ribes eradication work on the Forest Service Project was checked by the Bureau and reimbursement for the cost of the work was claimed from the various Forests in proportion to the amount of work done.

Summary of Ribes Eradication

The detailed results of accomplishments in 1947 and general summaries of all control work done to date by the Forest Service are presented in tables 1 to 9 which follow this text.

The seasonal summary by state for ribes eradication by the Forest Service during 1947 is as follows:

<u>State</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
*Oregon	2,760	10,388	13,148	6,194	199,128
**California	11,655	27,804	39,459	29,906	4,848,276
Totals	14,415	38,192	52,607	36,100	5,047,404

*Includes R-5 work on the Klamath National Forest and all R-6 contract work.

**Includes 1947 spray projects and contract work.

RECOMMENDATIONS

Blister rust control activities by the Forest Service in 1948 should emphasize the following:

1. Continued use of the 2,4-D ribicide for treating heavy ribes concentrations occurring on the best sugar pine producing areas.

2. Experimentation in contracting eradication work on all Forests in R-5 with further exploitation and experimentation in R-6.
3. Integration of timber management policies and blister-rust-control work with the objective of reducing ribes regeneration and encouraging reproduction and growth of sugar pine.

TABLE 1

SUMMARY OF RIBES ERADICATION BY THE FOREST SERVICE - 1947

National Forest	Acres			8-Hour Man Days	Ribes Eradicated	Per Acre Worked		Ownership Status																Acres Ribes-Free At Re- eradication
	Worked	Blocked Out	Total			Federal	O & C	Acres Covered				8-Hour Man Days				Ribes Eradicated								
								Federal	O & C	Total	Private	Federal	O & C	Total	Private	Ribes Eradicated								
																National Forest	O & C	Total	Private	National Forest	O & C	Total	Private	
Initial Work																								
California:																								
Klamath	2,605	160	2,765	2,738	224,346	1.04	86	422				422	2,363	492	492	2,246	20,295		20,295	204,661				
Plumas	1,691	504	2,195	5,004	968,572	1.35	352	2,389				2,389	1,806	2,657	2,657	2,347	320,750		320,750	241,782				
Kidderado	3,103	195	3,298	1,293	785,857	1.08	253	2,451				2,451	897	2,558	2,558	1,035	585,024		585,024	290,771				
Stanislaus	309		309	199	455,200	0.64	1,473	279				279	30	180	180	19	404,700		404,700	50,500				
Sierra	1,058		1,058	1,719	773,751	1.61	730	1,065				1,065		1,719	1,719		773,751		773,751					
Subtotals	10,736	859	11,595	12,953	2,808,336	1.20	260	6,609				6,609	5,046	7,306	7,306	5,647	2,110,630		2,110,630	697,706				
Oregon:																								
Umpqua	1,463	859	2,322	928	17,344	0.61	12	2,322				2,322		928	928		17,344		17,344					
Rogue	164		164	105	4,424	0.65	27	164				164		105	105		4,424		4,424					
Klamath	274		274	893	23,075	1.26	84	274				274		893	893		23,075		23,075					
Subtotals	1,901	859	2,760	1,927	44,843	1.01	24	2,760				2,760		1,927	1,927		44,843		44,843					
Totals	12,637	1,718	14,355	14,880	2,853,179	1.17	225	9,369				9,369	5,046	9,233	9,233	5,647	2,155,473		2,155,473	697,706				
Reeradication																								
California:																								
Klamath	537		537	443	40,273	0.83	75	12				12	525	10	10	433	768		768	39,505				
Plumas	14,349		14,349	7,501	873,283	0.52	61	7,485				7,485	6,855	4,492	4,492	3,009	424,504		424,504	448,785				
Kidderado	3,418		3,418	2,242	239,556	0.66	88	2,805				2,805	913	1,794	1,794	458	183,611		183,611	108,914				
Stanislaus	5,805		5,805	4,158	585,216	0.72	101	5,330				5,330	415	3,596	3,596	262	563,519		563,519	24,097				
Sierra	3,704		3,704	2,609	241,637	0.70	55	2,184				2,184	520	2,350	2,350	259	208,997		208,997	32,640				
Subtotals	27,804		27,804	16,553	2,039,940	0.61	73	18,876				18,876	6,928	12,532	12,532	4,421	1,385,399		1,385,399	654,541				
Oregon:																								
Rogue	8,702		8,702	2,817	135,511	0.32	16	8,109				8,109	593	2,681	2,681	136	119,593		119,593	16,218				
Klamath	431		431	176	3,755	0.41	9	306				306	341	90	90	29	1,156		1,156	1,737				
Subtotals	10,388		10,388	4,267	154,285	0.41	15	9,293				9,293	1,060	3,724	3,724	29	13,224		13,224	21,420				
Totals	38,192		38,192	21,220	2,194,225	0.56	57	28,169				28,204	9,588	16,266	16,266	29	16,285	4,935	1,517,623	641	1,518,264	675,961		
All Workings																								
California:																								
Klamath	3,162	160	3,322	3,181	265,239	1.01	84	434				434	2,868	502	502	2,679	21,063		21,063	244,156				
Plumas	18,031	504	18,535	12,505	1,435,861	0.68	80	9,874				9,874	8,661	7,149	7,149	5,556	745,294		745,294	650,567				
Kidderado	6,221	195	6,416	5,535	1,084,352	0.85	167	5,265				5,265	1,260	4,042	4,042	1,493	774,705		774,705	322,687				
Stanislaus	6,114		6,114	4,357	1,041,416	0.71	170	5,669				5,669	445	4,076	4,076	281	966,219		966,219	75,197				
Sierra	4,772		4,772	4,328	1,021,388	0.91	214	4,252				4,252	520	4,065	4,065	259	988,748		988,748	32,640				
Subtotals	38,500	859	39,359	25,506	4,882,276	0.77	126	25,485				25,485	13,974	19,838	19,838	10,668	3,496,029		3,496,029	1,352,247				
Oregon:																								
Umpqua	1,463	859	2,322	928	17,344	0.61	12	2,322				2,322		928	928		17,344		17,344					
Rogue	8,656		8,656	2,817	130,235	0.33	16	8,271				8,271	593	2,687	2,687	136	124,071		124,071	16,218				
Klamath	431		431	176	3,755	0.41	9	306				306	341	90	90	29	1,156		1,156	1,737				
Subtotals	10,550	859	11,409	3,921	154,325	0.42	25	12,053				12,053	1,060	3,724	3,724	29	13,224		13,224	21,420				
Totals	50,889	1,718	52,607	36,100	5,047,401	0.74	99	37,538				37,538	15,034	25,489	25,489	29	25,518	10,582	3,673,036	641	3,673,737	1,371,667		

TABLE 2

SUMMARY OF RIBES ERADICATION BY THE FOREST SERVICE 1933-1947

National Forest	Acres			8-Hour Man Days	Ribes Eradicated	Per Acre Worked		Acres Covered				Ownership Status				Ribes Eradicated				Acres Ribes-Free At Re-eradication
	Worked	Blocked Out	Total			8-Hour Man Days	Ribes	Federal			8-Hour Man Days Federal			Federal						
								National Forest	O & C	Total	National Forest	O & C	Total	National Forest	O & C	Total	Private			
Initial Work																				
California:																				
Klamath	27,942	2,103	30,045	30,851	2,874,812	1.10	103	8,652				8,652	21,393	9,041	9,041	21,810	1,069,869		1,069,869	1,604,943
Lassen	17,684	1,399	19,083	16,316	1,941,142	0.96	110	2,716				2,716	16,371	2,268	2,268	14,668	302,147		302,147	1,618,992
Plumas	60,580	9,785	70,365	73,904	11,995,158	1.11	174	61,508				61,508	12,817	50,693	50,693	23,211	8,841,282		8,841,282	1,123,878
Kidderado	44,614	5,314	49,928	31,847	8,186,232	0.71	181	44,637				44,637	7,291	31,328	31,328	8,519	6,746,268		6,746,268	1,439,994
Stanislaus	51,286	9,181	60,467	33,753	8,599,474	0.68	167	13,644				13,644	6,823	24,467	24,467	6,888	6,414,610		6,414,610	2,154,804
Sierra	113,028	14,813	127,841	38,150	8,659,759	2.93	662	12,135				12,135	1,376	55,829	55,829	2,351	7,982,103		7,982,103	613,656
Subtotals	221,114	28,295	249,409	285,471	42,162,577	1.02	131	185,292				185,292	34,071	148,088	148,088	79,495	31,356,279		31,356,279	10,606,536
Oregon:																				
Umpqua	1,463	859	2,322	928	17,344	0.61	12	2,322				2,322		928	928		17,344		17,344	
Rogue	936		936	1,164	135,053	0.24	14	936				936		1,164	1,164		135,053		135,053	
Shasta	5,075	5,244	10,319	5,820	210,145	1.15	42	6,275				6,275	1,926	5,338	5,338	458	171,138	25,326	196,500	14,225
Klamath	2,060		2,060	4,178	31,337	2.01	151	1,130				2,080		974	4,178		31,309	173,428	31,337	
White Pine Plantation	345	535	680	373	124,744	2.57	860	680				680		373	373		124,744		124,744	
Subtotals	9,599	6,536	16,135	12,453	601,223	1.28	83	11,365	3,048	14,411	1,926	9,430	2,545	11,375	488	588,244	198,754	786,998	14,225	
Totals	230,817	34,833	265,700	237,934	42,963,800	1.03	186	196,655	3,048	199,703	65,997	155,456	2,545	158,001	79,933	314,543,523	198,754	32,143,277	10,620,523	
Reeradication																				
California:																				
Klamath	10,726		10,726	10,044	331,356	0.94	31	3,835				3,835	6,891	4,026		4,026	6,018	185,947		185,947
Lassen	4,779		4,779	2,346	294,905	0.49	43	622				622	4,157	291	291	2,085	5,014	5,014		5,014
Plumas	89,917		89,917	55,680	6,131,437	0.53	68	49,559				49,569	20,946	30,563	30,563	22,217	3,151,945	3,151,945		3,151,945
Kidderado	60,085		60,085	35,002	2,777,145	0.58	46	34,065				34,065	26,024	21,913	21,913	14,445	1,465,020	1,465,020		1,465,020
Stanislaus	78,434		78,434	35,368	5,406,037	0.56	69	58,139				58,139	20,295	29,959	29,959	15,829	4,451,994		4,451,994	
Sierra	50,407		50,407	38,364	11,189,940	0.76	222	42,692				42,692	8,215	33,674	33,674	4,690	10,247,833	10,247,833		10,247,833
Subtotals	204,352		204,352	184,024	26,040,011	0.66	88	188,822				188,822	105,530	113,716	113,716	4,688	19,589,233	19,589,233		19,589,233
Oregon:																				
Rogue	25,167		25,167	13,695	782,144	0.54	31	23,270				23,270	1,897	12,863	12,863	837	727,508		727,508	
Shasta	1,861		1,861	1,092	18,051	0.66	11	666	875	1,541	120	428	592	1,020	72	3,974	15,944		15,944	
Klamath	2,450		2,450	2,068	40,102	0.84	16	1,934	139	2,073	377	1,489	250	1,739	329	82,558	14,300	36,888	3,244	
White Pine Plantation	212		212	228	29,257	1.14	212	212				212		212		29,257		29,257		
Subtotals	29,490		29,490	17,063	870,524	0.58	30	26,082	1,014	27,096	2,394	15,008	842	15,850	1,233	743,937	26,270	80,267	59,987	
Totals	323,842		323,842	201,107	26,910,265	0.52	83	241,904	1,014	251,918	107,924	134,744	842	135,586	65,521	20,173,230	26,270	20,399,500	6,510,765	
All Workings																				
California:																				
Klamath	28,668		28,668	40,771	40,895	3,206,168	1.06	83	12,487			12,487	28,264	13,067	13,067	27,828	1,355,816		1,355,816	
Lassen	22,465		22,465	1,399	23,866	19,282	2,145,237	0.86	95	3,738		3,738	20,526	2,529	2,529	16,773	307,161		307,161	
Plumas	156,477		156,477	9,785	166,262	125,748	16,046,995	0.81	116	113,077		113,077	33,115	81,256	81,256	45,438	11,992,737		11,992,737	
Kidderado	119,750		119,750	5,314	125,064	66,860	10,353,718	0.94	106	76,732		76,732	11,115	44,461	44,461	22,568	6,820,286		6,820,286	
Stanislaus	156,477		156,477	9,181	156,658	79,141	13,375,611	0.61	108	111,783		111,783	11,018	94,826	94,826	24,315	10,958,574		10,958,574	
Sierra	63,435		63,435	483	63,918	76,504	15,815,699	1.21	312	58,727		58,727	9,191	69,503	69,503	7,041	16,829,336		16,829,336	
Subtotals	515,470		515,470	28,245	543,715	409,445	58,202,588	0.79	332	374,114		374,114	169,601	286,762	286,762	143,730	50,945,512		50,945,512	
Oregon:																				
Umpqua	1,463		1,463	859	2,322	928	17,344	0.61	12	2,322		2,322		928	928		17,344		17,344	
Rogue	29,103		29,103	14,890	9,117,917	0.57	35	24,206				24,206	1,897	14,027	14,027	832	862,561		862,561	
Shasta	6,736		6,736	11,980	6,912	228,736	1.03	74	6,941	2,993	9,934	2,046	4,789	1,563	6,352	360	175,168		175,168	
Klamath	4,530		4,530	4,530	6,246	357,439	1.38	78	3,084	1,069	4,153	777	4,093	1,624	5,917	329	162,467	187,768	350,195	
White Pine Plantation	39,182		39,182	6,536	45,718	69,701	1,665	433	692		692		4,320	24,536	1,387	237,587	146,464	52,173,275	225,024	
Subtotals	79,182		79,182	6,536	45,718	69,701	1,665	433	692		692		4,320	24,536	1,387	237,587	146,464	52,173,275	225,024	
Totals	594,652		594,652	589,542	439,041	59,871,066	0.79	126	411,559	4,062	415,621	173,921	290,200	3,387	293,587	646,464	52,173,275	225,024	52,542,777	



TABLE 3

SUMMARY OF CHEMICAL SPRAY WORK BY THE FOREST SERVICE IN 1947

Operation	Acres Covered	Man Days		Ribes Sprayed	Gal. of Spray Used	Per Acre		Ribes Per Gallon
		* Effective	**Super-visory			Effective Man Days	Gal. Spray	
Eldorado	385	199	61	455,200	51,700	0.64	167	8.80
Stanislaus	309	173	41	226,500	52,100	0.45	135	4.35
Sierra	283	351	56	492,800	70,400	1.24	249	7.00
Totals	977	723	158	1,174,500	174,200	0.74	178	6.74

* Includes nozzle men and operators

**Principally the foreman's time

TABLE 4
SUMMARY OF RIBES ERADICATION BY CONTRACT - 1947

National Forest	Agency	Acres Contracted	Estimated 8-Hour Man Days	Ribes Eradicated	Per Acre 8-Hr. Man Days	Average Bid Price Per Acre	Contract Cost	Acres Ribes Free At Time Of Eradication
Initial Work								
California:								
Klamath	FS	202	37	13,419	.18	\$ 5.25	\$ 1,060.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Totals	All	615	217	18,218	.35	4.75	2,919.00	367
Reeradication								
California:								
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Oregon:								
Siskiyou	FS	431	176	3,755	.41	10.32	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	3,881	805	65,373	.21	5.52	21,415.55	2,470
Subtotals	All	5,083	1,342	81,203	.26	6.32	32,129.75	4,863
Totals	All	5,643	1,710	110,109	.30	6.41	36,189.75	4,863
All Workings								
California:								
Klamath	FS	202	37	13,419	.18	5.25	1,060.50	-
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Subtotals	All	762	405	42,325	.53	6.72	5,120.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Siskiyou	FS	431	176	3,755	.41	10.33	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	3,881	805	65,373	.21	5.52	21,415.55	2,470
Subtotals	All	5,496	1,522	86,002	.28	6.18	33,982.25	5,230
Totals	All	6,258	1,927	128,327	.31	\$ 6.25	\$ 39,108.75	5,230

TABLE 5

CUMULATIVE SUMMARY OF RIBES ERADICATION BY CONTRACT 1946-1947

National Forest	Agency	Acres Contracted	Estimated 8-Hour Man Days	Ribes Eradicated	Per Acre 8-Hr. Man Days	Average Bid Price Per Acre	Contract Cost	Acres Ribes Free At Time Of Eradication
Initial Work								
California:								
Klamath	FS	202	37	13,419	.18	5.25	\$ 1,060.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Totals	All	615	217	18,218	.35	4.75	2,919.00	367
Reeradication								
California:								
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Oregon:								
Siskiyou	FS	431	176	3,755	.41	10.32	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	4,051	850	68,701	.21	5.74	23,215.55	3,000
Subtotals	All	5,253	1,387	84,531	.26	6.34	33,929.75	5,393
Totals	All	5,813	1,755	113,437	.33	6.54	37,989.75	5,593
All Workings								
California:								
Klamath	FS	202	37	13,419	.18	5.25	1,060.50	-
Plumas	FS	560	368	28,906	.66	7.25	4,060.00	-
Subtotals	All	762	405	42,325	.53	6.72	5,120.50	-
Oregon:								
Umpqua	FS	413	180	4,799	.44	4.50	1,858.50	367
Siskiyou	FS	431	176	3,755	.41	10.33	4,450.00	1,609
Siskiyou	O&C	771	361	12,075	.47	8.12	6,264.20	784
Rogue	FS	4,051	850	68,701	.21	5.74	23,215.55	3,000
Subtotals	All	5,666	1,567	89,330	.28	6.31	35,788.25	5,760
Totals	All	6,428	1,972	131,665	.31	6.37	\$40,908.75	5,760

TABLE 6

SUMMARY OF CHECKING ON THE FOREST SERVICE PROJECT - 1947

Operation	Regular Check			Advance Check			Post Check			All Checks		
	Acres Covered By Final Check	Per Cent of Check	Man Days	Acres Covered	Per Cent of Check	Man Days	Acres Covered	Per Cent of Check	Man Days	Acres Covered	Per Cent of Check	Man Days
Oregon												
Rogue River	8,726	5.7	234.3	-	-	-	13,848	4.6	221.6	22,574	5.0	455.9
Siskiyou	431	5.8	24.1	-	-	-	-	-	-	431	5.8	24.1
Umpqua	1,463	5.7	37.5	2,604	5.4	51.5	-	-	-	4,067	5.5	89.0
Totals	10,620	5.7	295.9	2,604	5.4	51.5	13,848	4.6	221.6	27,072	5.1	569.0
California												
Plumas	15,110	4.2	321.5	3,854	2.7	85.6	18,834	4.0	301.0	37,798	4.0	708.1
Eldorado	6,229	3.6	107.9	7,806	2.5	107.9	1,320	3.3	27.1	15,955	3.0	242.9
Stanislaus	6,650	3.8	149.5	160	9.4	13.7	15,686	3.2	159.4	22,496	3.4	322.6
Tahoe	-	-	-	12,694	2.6	250.0	-	-	-	12,694	2.6	250.0
Sierra	3,874	4.0	69.5	6,733	2.5	96.7	8,823	2.2	54.4	19,430	2.7	220.6
Klamath	4,945	7.9	140.8	2,726	2.3	19.2	-	-	-	7,671	5.9	160.0
Totals	36,808	4.5	789.2	33,973	2.6	573.1	45,263	3.4	541.9	116,044	3.5	1,904.2
Pacific Coast Region												
Totals	47,428	4.8	1,085.1	36,577	2.8	624.6	59,111	3.7	763.5	143,116	3.8	2,473.2

TABLE 7
(Omnibus Table 2 - Sheet 1)
ACREAGE WORKED ON NATIONAL FOREST LANDS IN THE PACIFIC COAST REGION - 1947

National Forest	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
Klamath	422	12	-	434
Lassen	819	2,090	-	2,909
Plumas	2,656	3,041	4,444	10,141
Eldorado	2,756	1,340	1,565	5,661
Stanislaus	1,553	1,175	5,850	8,578
Sierra	1,068	294	4,539	5,901
California Totals	9,274	7,952	16,398	33,624
Umpqua	2,322	-	-	2,322
Siskiyou	80	730	-	810
Rogue River	164	870	7,239	8,273
Klamath	274	878	-	1,152
Oregon Totals	2,840	2,478	7,239	12,557
Totals	12,114	10,430	23,637	46,181

TABLE 8
(Omnibus Table B - Sheet 1)

STATUS OF RIBES ERADICATION ON NATIONAL FOREST LANDS
IN THE PACIFIC COAST REGION AS OF DECEMBER 31, 1947

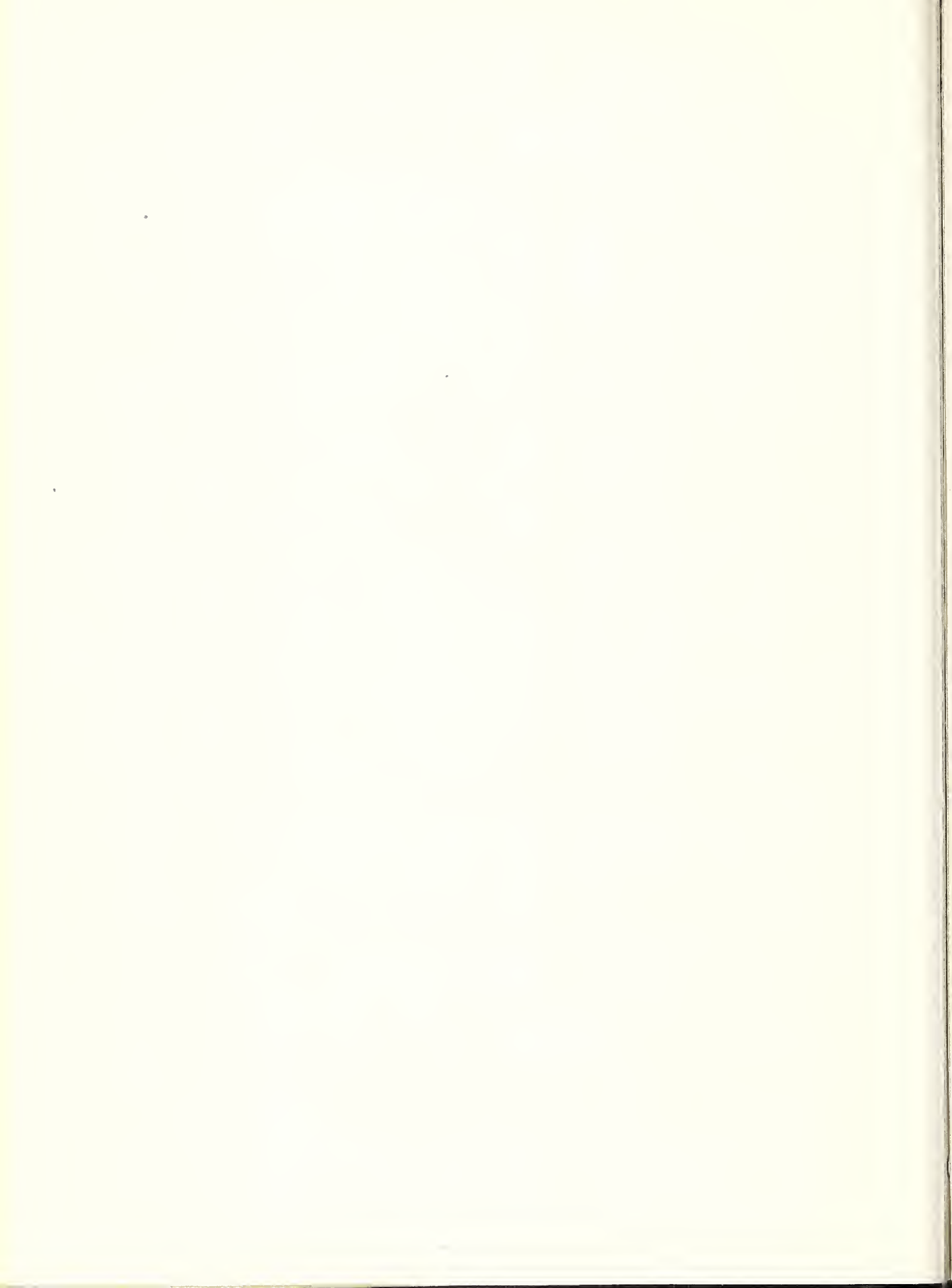
National Forests	Total Acres		First Working		Second Working		Other Workings		On Maintenance		Remaining Work	
	White Pine	Control Area	acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
Mendocino	21,017	21,017	-	-	-	-	-	-	-	-	21,017	-
Trinity	122,575	122,575	-	-	-	-	-	-	-	-	122,575	-
Klamath	19,650	19,650	8,652	44.03	3,669	166	530	2.70	10,998	8,122	3,611	-
Shasta	3,611	3,611	-	-	-	-	-	-	-	-	3,611	-
Lassen	*69,172	*69,172	*14,052	20.27	4,632	580	*2,467	3.51	55,120	11,585	19,925	-
Plumas	186,585	186,585	89,885	48.17	42,515	13,423	22,317	11.96	96,700	67,568	19,925	-
Tahoe	19,925	19,925	-	-	-	-	-	-	-	-	19,925	-
Eldorado	117,725	117,725	72,580	61.65	37,277	7,733	11,826	10.05	45,145	60,754	125,618	47,773
Stanislaus	106,691	106,691	80,233	75.20	51,917	35,449	15,583	14.61	26,458	64,650	43,930	-
Sierra	173,391	173,391	47,773	27.55	26,585	18,911	-	-	-	-	43,930	-
Sequoia	43,930	43,930	-	-	-	-	-	-	-	-	43,930	-
California Totals	884,272	884,272	313,175	35.42	166,595	76,262	52,723	5.96	571,097	260,452	21,422	57,888
Rogue River	87,491	87,491	66,069	75.52	30,312	12,908	8,181	9.35	21,422	57,888	28,396	12,729
Siskiyou	51,084	51,084	22,688	44.41	2,004	160	9,959	19.50	28,396	12,729	-	680
Siuslaw	680	680	680	100	127	85	-	-	-	-	-	-
Umpqua	60,353	60,353	2,322	3.85	-	-	859	1.42	58,031	1,463	4,142	4,667
Klamath	9,031	9,031	4,889	54.14	1,934	-	222	2.46	4,142	4,667	-	-
Oregon Totals	208,639	208,639	96,648	46.32	34,377	14,153	19,221	9.21	111,991	77,427	683,088	337,879
Totals	1,092,911	1,092,911	409,823	37.50	200,372	90,415	71,944	6.58	683,088	337,879	-	-

*Includes 40 acres, Latour State Forest.

TABLE 9
SUMMARY OF RINES ERADICATION BY AGENCY OF NATIONAL FOREST LAND 1925-1947

State	Acreage Of National Forest Land in Control Area	Calendar Year	A c r e a g e W o r k e d B y										Total Acreage According To Present Ownership (Initial Eradi- .)	Unworked Acreage		
			Forest Service			Bureau			O & C							
			Initial Work	Reeradi- cation	Total	Initial Work	Reeradi- cation	Total	Initial Work	Reeradi- cation	Total	Total Acreage Worked By All Agencies				
												Initial Work			Total	
California	884,272	1926 to 1946	178,683	169,946	348,629	125,588	48,601	174,189				304,271	218,547	522,818	313,175*	571,097
		1947	6,609	18,876	25,485	2,665	5,474	8,139				9,274	24,350	33,624		
		Totals - - -	185,292	188,822	374,114	128,253	54,075	182,328				313,545	242,897	556,442		
		1925 to 1946	8,581	16,789	25,370	78,165	22,676	100,841	9,671	1,074	10,745	96,417	40,539	136,956		
Oregon	208,639	1947	2,760	9,293	12,053				80	424	504	2,840	9,717	12,557	96,648**	111,991
		Totals - - -	11,341	26,082	37,423	78,165	22,676	100,841	9,751	1,498	11,249	99,257	50,256	149,513		
Total Pacific Coast Region	1,092,911		196,633	214,904	411,537	206,418	76,751	283,169	9,751	1,498	11,249	412,302	293,153	705,955	409,823	683,088

*Excludes 370 acres now in Yosemite National Park.
**Excludes 2,609 acres of initial work in abandoned Mt. Hood unit.



PART V

BLISTER RUST CONTROL BY THE NATIONAL PARK SERVICE

Financial Project BLR-5

By

S. Daryl Adams, Agent

PURPOSE

The purpose of this project is to protect from blister rust the white pine stands having aesthetic and recreational value within the National Park boundaries.

COOPERATION

In June 1945 the Department of Agriculture and the Department of the Interior entered into a Memorandum of Understanding which authorized their respective regions to develop and execute cooperative blister-rust-control programs to accomplish the maximum benefits in the most efficient manner. Now only brief memoranda of agreement are necessary between the regions of each agency. The full text of this interdepartmental agreement appears on pages 10-11 of the 1945 annual report.

LOCATION AND ORGANIZATION OF WORK

Eight blister-rust-control camps were operated within the National Parks; five in Yosemite under the direction of Park Forester Emil F. Ernst and three in Sequoia-Kings Canyon under the direction of Park Forester Carlock E. Johnson. Representatives of the Bureau of Entomology and Plant Quarantine were responsible for the technical supervision of the eradication and direct supervision of the checking work.

DISTRIBUTION OF PARK SERVICE CAMPS

Park	Location of Camp	Maximum Strength	Operating Period	Number of Field Working Days	Average No. Men in Field Per Work Day
Yosemite	Carl Inn	50	July 9 to Sept. 4	37	30
	Sugar Pine Pass	40	May 16 to Aug. 22	62	26
	Crane Flat	50	May 5 to Sept. 19	87	22
	Chinquapin	50	June 11 to Sept. 12	65	30
	Wawona	60	Apr. 17 to Oct. 24	126	25
Sequoia-Kings Canyon	Redwood Mt.	50	May 12 to Sept. 7	92	23
	Red Fir	50	June 9 to Sept. 7	72	22
	Marble Fork	40	July 7 to Aug. 29	44	19
Totals	8	390			

The Park Service camps were manned by 17-year-old high-school boys and college students, most of whom were recruited by the Bureau. Fortunately, many of these men were experienced blister-rust-control workers. A few men were hired locally from the nearby towns and farm areas. In general, the quality of the labor was better than that of the past few years.

Wage rates for laborers were increased this year from \$0.882 per hour to \$0.970 and for crewleaders from \$0.970 to \$1.07 per hour. The rates for classified personnel remained unchanged from those of 1946. The charge for subsistence was increased from \$0.56 to \$0.65 per meal. The lodging charges of \$0.20 per day in Yosemite and \$0.10 per day in Sequoia-Kings Canyon remained unchanged.

The Park Service camps lost considerable eradication time because of fire suppression duty on the Parks and the Sierra National Forest.

ACCOMPLISHMENTS

Yosemite National Park

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s</u>	<u>W o r k e d</u>	<u>Man</u>	<u>Ribes</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Days</u>	<u>Destroyed</u>
Carl Inn	-	1,323	1,323 1,097	46,362
Crane Flat	-	2,040	2,040 2,216	269,623
Sugar Pine Pass	-	563	563 1,415	263,811
Chinquapin	-	1,184	1,184 1,872	115,452
Wawona	864	1,948	2,812 3,163	248,113
Spray Project	<u>85</u>	<u>-</u>	<u>85</u> 201	<u>61,000</u>
Totals	949	7,058	8,007 9,964	1,004,361

The Carl Inn camp, located on the South Fork of the Tuolumne River at the Big Oak Flat entrance to Yosemite, started field operations early in July. Most of the work was reeradication of ribes in the vicinity of Aspen Valley.

The crews from the Crane Flat camp, located near the junction of the Oak Flat and Tioga roads, performed reeradication work on the mature timbered areas adjacent to these roads and initial and reeradication work on the cut-over area south of the camp site. Progress on the latter area has been slow because of the dense ground cover present. However, the mature timbered areas are relatively free from brush and support few ribes.

From the Sugar Pine Pass camp, located a half-mile north of the Merced Grove of Big Trees, the hand eradication crews spent the entire season on reeradication work on the cut-over area in the immediate vicinity of the camp site. A power spray unit was used to apply 2,4-D chemical in the initial treatment of 85 acres that supported heavy concentrations of ribes. About 300 acres remain to be sprayed in this camp area.

The Chinquapin camp, built at the intersection of the old Yosemite Lumber Company railroad and the Wawona Road, was put into operation this season for the first time. The crews devoted the entire season to reeradication

work on the old cut-over lands in this area. A considerable amount of reeradication work remains to be done along the highway between the Wawona Tunnel and Bishop Creek.

The Wawona camp crews spent their time on initial and reeradication work. Practically all initial work that can be reached from this camp site has been completed. The unworked area north of Wawona will have to be covered from a pack camp.

The progress made to date and the work remaining in Class A priorities are shown in the following table.

STATUS OF RIBES ERADICATION ON CLASS A PRIORITY AREAS OF
YOSEMITE NATIONAL PARK

Area	A c r e s				
	Total	Initially Worked	Unworked	* Reworked	**Rework Required
Priority A-1					
Big Oak Flat Road	9,270	9,110	160	11,670	1,218
Mariposa Grove	3,000	3,000	-	2,560	1,125
Wawona Road	6,480	6,480	-	1,024	5,396
Total	18,750	18,590	160	15,254	7,739
Priority A-2					
Alder Creek	1,920	1,740	180	1,227	-
Total Priority A-1 and A-2	20,670	20,330	340	16,481	7,739
Priority A-3	56,730	37,169	19,561	16,672	14,392
Total Class A Area	77,400	57,499	19,901	33,153	22,131

* Includes second and third workings and acres found to be ribes free at the time of reeradication.

**The post check will show that part of this area is ribes free and will not need rework.

Sequoia-Kings Canyon National Parks

Ribes Eradication in 1947

Camp	A c r e s W o r k e d			Man Days	Ribes Destroyed
	Initial	Reeradication	Total		
Redwood Mountain	640	585	1,225	2,303	409,421
Red Fir	996	2,569	3,565	1,616	177,741
Marble Fork	474	506	980	823	70,181
Spray	33	-	33	14	8,809
Totals	2,143	3,660	5,803	4,756	666,152

The Redwood Mountain camp, which was built in the fall of 1946, was manned on May 13 by local men and boys from the Visalia area. Since labor turn-over in this crew was heavy, the quality and quantity of the work was below standard. Many replacements were made after the school boys became available. The crews from this camp completed all the reeradication work

in the General Grant Grove section and the initial eradication work in the Wilsonia area. The remainder of the season was spent on initial eradication work in the northern part of the Redwood Mountain unit. This latter area is very steep and supports numerous rock-bound Ribes roezli and R. nevadense. Chemical spray was used effectively on the ribes bushes along the Generals Highway, and its use will be continued in future work.

The crews from the Red Fir camp, composed of high school and college students, completed the reeradication work in the Lodgepole-Giant Forest area and continued initial eradication work in the northern part of the Giant Forest unit. Next season the reeradication work in the Halstead Creek-Suwanee Creek area will be completed and additional initial eradication work will be done in the vicinity of Lost Grove.

The Marble Fork camp was manned on July 7 by high school and college students. Since a number of these boys had had previous blister-rust-control experience, very little training was required and personnel turnover was exceptionally light. These crews completed the reeradication and continued the initial eradication work on the southern part of the Giant Forest unit. In 1948 this camp will devote the entire season to initial eradication work. The area supports many concentrations of R. tulareense on which chemical spray will be used.

Two of the camps were late in getting started because available manpower was limited in May and considerable camp construction work was required before the camps could be manned. Two barracks buildings were put up at Red Fir to replace the old tent platforms, and a complete camp was built at Marble Fork. Now that all three camps are completely built, ribes eradication work can be started early in June next season, provided satisfactory labor is available.

Each field crew was equipped with a small can of 2,4-D concentrate for treating the crowns of decapitated, troublesome bushes. This method proved effective and economical since large rock-bound bushes are numerous, especially in the Redwood Mountain area and the Marble Fork drainage.

The progress made to date and the work remaining in Class A priorities are shown in the following table.

STATUS OF RIBES ERADICATION ON CLASS A PRIORITY AREAS OF
SEQUOIA-KINGS CANYON NATIONAL PARKS

Area	A c r e s				
	Total	Initially Worked	Unworked	Reworked	Rework Required
Giant Forest Unit	21,100	13,860	7,240	9,625	2,210
General Grant Grove Unit	5,470	5,439	31	3,841	-
Redwood Mountain Unit	7,100	513	6,587	-	-
Totals	33,670	19,812	13,858	13,466	2,210

Checking

In Yosemite the checking organization consisted of one checker foreman, four senior checkers, and four checkers. Sequoia-Kings Canyon employed four checkers. These men were paid and supervised by the Bureau; reimbursement for their services was made by the Park Service. Although the quality of this year's checking work was still below the pre-war standard, an improvement over the work of the past few years was evident. Regular and post checking accounted for the major part of the checker's time. Most of the regular check is up to date at present and sufficient post and advance check data are available for the start of the 1948 season. The complete results of the National Parks' checking project are shown in table 4, which follows this section of the report.

Summary of Ribes Eradication

During the 1947 season 1,670,513 ribes were destroyed on 13,810 acres (initial and reeradication work), an expenditure of 14,720 man days. These figures include 215 man days spent on the chemical spray (2,4-D) treatment of 69,809 ribes on 118 acres. Progress toward the completion of needed reeradication work met the objectives outlined for the season. All reeradication work was brought up to date in Kings Canyon; about four sections remain in Sequoia and about ten sections in Yosemite. The initial eradication of ribes in the National Parks is about 35 per cent complete as of December 31, 1947. Of the total 289,977 acres within the control unit boundaries, 187,560 acres remain unworked.

A summary of the season's results are presented in detail in the tables which follow this text.

RECOMMENDATIONS

In Yosemite National Park five camps are to be operated in 1948. The work programs should include plans to:

1. Continue the chemical spray work in the Sugar Pine Pass area.
2. Complete the initial coverage of the remaining 340 acres of A-1 and A-2 priority area near Chinquapin.
3. Complete the 10 remaining sections of reeradication work.
4. Start the initial work in the South Fork of the Tuolumne River area, which can probably be done most effectively from a pack camp out of Crane Flat.
5. Make every effort to keep the Crane Flat and Chinquapin crews in the field for the maximum length of the season, since work there is farther behind than at the other camps.

In the Sequoia-Kings Canyon National Parks three camps are to be operated in 1948. Their work plans should give consideration to:

1. The completion of the needed reeradication work at Red Fir.

2. The completion of the initial eradication work on the few remaining acres at Grant Grove. This area should be treated with 2,4-D chemical spray.
3. The continuance of the initial work on the Redwood Mountain and Giant Forest units. In order to further the progress of the work at Redwood Mountain it is recommended that the strength of this camp be increased from 50 to 70 men. The present camp facilities will accommodate this larger crew.
4. The continued and expanded use of 2,4-D chemical spray on all heavy concentrations of ribes, and the continued use of 2,4-D concentrates on the crowns of decapitated, troublesome bushes.

TABLE 1

SUMMARY OF RIBES ERADICATION BY THE NATIONAL PARK SERVICE - 1947*

National Park	Acres Worked**	8-Hour Man Days	Ribes Eradicated	Acres Ribes-Free At Re-eradication
Initial Work				
Yosemite	949	2,114	258,061	
Kings Canyon	673	1,664	317,506	
Sequoia	1,470	1,188	150,237	
Totals -	3,092	4,966	725,804	
Reeradication				
Yosemite	7,058	7,850	746,300	
Kings Canyon	585	653	100,724	
Sequoia	3,075	1,251	97,685	1,920
Totals -	10,718	9,754	944,709	1,920
All Workings				
Yosemite	8,007	9,964	1,004,361	
Kings Canyon	1,258	2,317	418,230	
Sequoia	4,545	2,439	247,922	1,920
Totals -	13,810	14,720	1,670,513	1,920

*All land worked by the National Park Service was National Park Service land. No other agency worked any Park Service land in 1947.

**No acres were blocked-out in 1947.

TABLE 2

SUMMARY OF RIBES ERADICATION BY THE NATIONAL PARK SERVICE 1933-1947

National Park	Acres			8-Hour Man Days	Ribes Eradicated	Per Acre Worked		Ownership Status						Acres Ribes-Free At Re-eradication	
	Worked	Blocked Out	Total			8-Hour Man Days	Ribes	Acres Covered		8-Hour Man Days		Ribes Eradicated			
								Federal	Private	Federal	Private	Federal	Private		
Initial Work															
Crater Lake	406	3,226	3,632	412	130,162	1.01	321	3,632		412			130,162		
Lassen Volcanic	6,610	10,955	17,565	5,734	771,673	0.87	117	17,425	140	5,679	55		756,696	14,977	
Yosemite*	46,653	6,536	53,189	87,880	11,788,435	1.88	253	53,189		87,880			11,788,435		
Kings Canyon	5,940		5,940	9,329	1,497,098	1.57	252	5,940		9,329			1,497,098		
Sequoia	13,885		13,885	14,707	1,809,967	1.06	130	13,885		14,707			1,809,967		
Subtotals-Calif.	73,088	17,491	90,579	117,650	15,267,173	1.61	217	90,439	140	117,595	55		15,852,196	14,977	
Totals -	73,494	20,717	94,211	118,062	15,997,335	1.61	218	94,071	140	118,007	55		15,982,358	14,977	
Reeradication															
Crater Lake	350		350	81	13,430	0.23	38	350		81			13,430		795
Lassen Volcanic	3,055		3,055	1,567	124,443	0.51	41	3,040	15	1,561	6		123,705	738	2,334
Yosemite**	29,758		29,758	35,171	4,034,457	1.18	136	29,758		35,171			4,034,457		7,650
Kings Canyon	3,840		3,840	2,824	328,600	0.74	86	3,840		2,824			328,600		
Sequoia	5,262		5,262	1,957	133,683	0.37	25	5,262		1,957			133,683		4,707
Subtotals-Calif.	41,915		41,915	41,519	4,621,183	0.99	110	41,900	15	41,513	6		4,620,445	738	14,691
Totals -	42,265		42,265	41,600	4,634,613	0.98	110	42,250	15	41,594	6		4,633,875	738	15,486
All Workings															
Crater Lake	756	3,226	3,982	493	143,592	0.65	189	3,982		493			143,592		795
Lassen Volcanic	9,665	10,955	20,620	7,301	896,116	0.76	93	20,465	155	7,240	61		880,401	15,715	2,334
Yosemite	76,411	6,536	82,947	123,051	15,822,892	1.61	207	82,947		123,051			15,822,892		7,650
Kings Canyon	9,780		9,780	12,153	1,825,698	1.24	187	9,780		12,153			1,825,698		
Sequoia	19,147		19,147	16,664	1,943,650	0.87	102	19,147		16,664			1,943,650		4,707
Subtotals-Calif.	115,003	17,491	132,494	159,169	20,488,356	1.38	178	132,339	155	159,108	61		20,472,641	15,715	14,691
Totals -	115,759	20,717	136,476	159,662	20,631,948	1.38	178	136,321	155	159,601	61		20,616,233	15,715	15,486

*In addition 8,206 acres, 5,577 man days, and 1,711,351 ribes on lands worked by the Forest Service and the Bureau of Entomology and Plant Quarantine are now in Yosemite National Park.

**In addition 480 acres, 326 man days, and 298,657 ribes on lands worked by the Bureau of Entomology and Plant Quarantine are now in Yosemite National Park.



TABLE 3

THE STATUS OF RIBES ERADICATION IN THE NATIONAL PARKS OF THE
PACIFIC COAST REGION BY PRIORITY CLASSES AS OF DECEMBER 31, 1947

National Park	Total All Classes Acres	Class A				Class B				Class C	
		Total Acres	Un- worked Acres	Initial Working Acres	Reerad- ication Acres	Total Acres	Un- worked Acres	Initial Working Acres	Re- erad. Acres	Total acres	Un- worked Acres
Yosemite	146,300	77,400	19,901	57,499	33,153	34,600	30,913	3,682	330	34,300	34,300
Sequoia	99,900	21,100	7,240	13,860	9,625	50,600	50,600	-	-	28,200	28,200
Kings- Canyon	22,430	18,430	12,478	5,952	3,841	4,000	4,000	-	-	-	-
Lassen	17,565	11,196	-	11,196	1,979	6,369	-	6,369	1,076	-	-
Crater	3,782	3,782	150	3,632	350	-	-	-	-	-	-
Grand Totals	289,977	131,908	39,769	92,139	48,948	95,569	85,518	10,051	1,406	62,500	62,500

TABLE 4

SUMMARY OF CHEMICAL SPRAY WORK ON NATIONAL PARK LANDS
IN THE PACIFIC COAST REGION - 1947

Operation	Acres Covered	Man Days		Ribes Sprayed	Gal. of Spray Used	Per Acre		Ribes Per Gal.
		*Eff- ective	**Super- visory			Eff. Man Days	Gal. Spray	
Yosemite	85	201	42	61,000	64,875	2.36	763	0.94
Kings Canyon	33	14	-	8,809	725	0.42	22	12.15
Totals	118	215	42	69,809	65,600	1.82	556	1.06

*Nozzle and operator man days

**Principally the foreman's time

TABLE 5

SUMMARY OF CHECKING ON THE NATIONAL PARK SERVICE PROJECT - 1947

Operation	Regular Check			Advance Check			Post Check			All Checks		
	Acres Covered By Final Check	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days
Yosemite	8,207	4.4	210.0	1,198	3.8	36.3	11,820	2.7	163.2	21,225	3.4	409.5
Sequoia-Kings Canyon	5,042	5.0	105.5	1,966	2.4	27.9	4,894	3.5	69.6	11,902	3.9	203.0
Totals	13,249	4.6	315.5	3,164	2.9	64.2	16,714	2.9	232.8	33,127	3.6	612.5

TABLE 6
(Omnibus Table B - Sheet 1)

STATUS OF RIEES ERADICATION ON NATIONAL PARK LANDS
IN THE PACIFIC COAST REGION AS OF DECEMBER 31, 1947

National Park Lands	Total Acres		First Working		Second Working Acres	Other Workings Acres	On Maintenance		Remaining Work	
	White Pine	Control Area	Acres	Per Cent			Acres	Per Cent	Unworked Acres	Requiring Rework Acres
Lassen Volcanic	17,425	17,425	17,425	100	3,040	-	12,624	72.45	-	4,801
Yosemite Kings Canyon	143,790	143,790	61,395	42.70	25,289	4,949	8,033	5.59	82,395	53,362
Sequoia	22,430	22,430	5,940	26.48	3,255	585	-	-	16,490	5,940
California Totals	99,900	99,900	13,885	13.90	5,262	-	-	-	86,015	13,885
Crater Lake	283,545	283,545	98,645	34.79	36,846	5,534	20,657	7.23	184,900	77,988
	3,782	3,782	3,632	96.00	350	-	3,216	85.03	150	416
Totals	287,327	287,327	102,277	35.60	37,196	5,534	23,873	8.31	185,050	78,404

PART VI

BLISTER RUST CONTROL BY THE OREGON AND CALIFORNIA REVESTED LANDS ADMINISTRATION

Financial Project BLR-6

By

Lyle N. Anderson, Agent

PURPOSE

The purpose of this project is to protect from white pine blister rust selected stands of white pine growing on the lands managed by the Oregon and California Revested Lands Administration, an agency of the newly created Bureau of Land Management of the United States Department of the Interior. Since this area is entirely in Oregon, the project is confined to that state.

COOPERATION

The memorandum of understanding between the Bureau of Entomology and Plant Quarantine and the O & C Administration, first made effective on June 21, 1945, was continued in force during 1947. Under the terms of this agreement the Bureau is responsible for the leadership, coordination, and technical direction of all blister-rust-control work performed by the O & C Administration. Another responsibility of the Bureau is the application of new developments and methods to further the common objective in the fight against white pine blister rust with the most effective means and at the lowest cost.

LOCATION AND ORGANIZATION OF CONTROL WORK

The ribes eradication activities operated with O & C funds during the season of 1947 were under the supervision of the project superintendent, Robert C. Warnock. An office and supply warehouse were maintained in Medford. The broader aspects of the program were under the leadership of Mark J. Pike, Forester, of the O & C Administration regional office in Portland, Oregon. The following Bureau personnel furnished technical assistance in the field work and directed the checking program: Conrad P. Wessela, operation supervisor, Homer R. Bryan and Lyle N. Anderson, assistant operation supervisors. The Bureau also employed and supervised the checkers as one of its responsibilities. The salaries of checkers were paid by the Bureau and reimbursement was claimed for time spent checking O & C control units.

Three blister-rust-control camps were in operation during the 1947 field season with all work concentrated on and adjacent to the Siskiyou National Forest. Camp One was located on the Redwood Highway at Hayes Hill in the center of the Selma control unit, Camp Two at Hidden Valley in the south end of the unit, and Camp Three on Quartz Creek in the East Galice control

unit. A six-man contract eradication party was engaged in cleaning up scattered areas in Swede Basin. A disease survey party of 12 men, financed by the Bureau, conducted a survey of a portion of the East Galice control unit during their two-week stay in that area.

ACCOMPLISHMENTS

Siskiyou National Forest

Ribes Eradication in 1947

<u>Camp</u>	<u>A c r e s W o r k e d</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Initial</u>	<u>Reeradication</u>	<u>Total</u>		
Hayes Hill	723	3,594	4,317	2,277	62,644
Selma	-	3,208	3,208	1,261	131,735
Quartz Creek	1,708	-	1,708	649	33,607
Contract Project	-	771	771	361	12,075
Totals	2,431	7,573	10,004	4,548	240,061

On April 1 a portable mess hall capable of handling 14 men was moved to Hayes Hill and the prefabricated camp was set up. When that camp was constructed, the portable mess hall was moved to Hidden Valley, and later moved to Quartz Creek where it was used the remainder of the field season. The Hayes Hill camp was in operation for six months performing reeradication work on the area previously covered by the Bureau in 1939. Three sections of initial eradication work were done on an area of sugar pine of high value. The Selma camp at Hidden Valley completed its area on September 1 and the personnel moved to Hayes Hill. The Quartz Creek camp was opened on June 14 in an area on which blister rust is becoming well established. Its work was confined to initial ribes eradication. At the peak of the season 95 men were employed in the three camps.

On June 10 six experienced men started contract eradication work in the Swede Basin area. Four contracts were awarded and 771 acres covered at an average cost of \$8.12 per worked acre. This area is so steep and brushy that work by the regular blister-rust-control crews had failed to establish adequate protection. All contract work areas were checked out to a more rigid live stem standard than that employed on regular crew work. The final check showed an average of 0.3 bushes per acre with 0.5 feet of live stem per acre remaining and no single bush exceeding 3 feet of live stem. Most of the contract area was surveyed by staff compass and chain so that the worked acreage would agree with the contracted acreage.

A SUMMARY OF CONTRACT ERADICATION

<u>Acres Contracted</u>	<u>Estimated 8-Hour Man Days</u>	<u>Ribes Eradi- cated</u>	<u>Per Acre</u>		<u>Average Bid Price Per Acre</u>	<u>Contract Cost</u>	<u>Acres Ribes Free at Time of Eradication</u>
			<u>8-Hr. Man Days</u>	<u>Ribes</u>			
771	361	12,075	.47	15.7	\$8.12	\$6,264.20	784

The one-man crew system with dragline was used entirely throughout the season with very good results. All work areas were prestrung; the 2-1/2 chain wide crew lanes were tagged at 4 chain intervals and thus forming work units of one acre each. These one-acre blocks were used in recording bushes dug and in plotting the work progress on the large office map. This innovation has many possibilities in increasing the amount and quality of the individual crewman's work.

The type of labor was far superior to that used during the past few years; personnel turnover was light. Many of the men lived at home in the communities adjacent to the camps. In general the quality of the camp overhead was good. The success of the one-man crew depends upon the availability of a greater percentage of men of subforeman caliber, who may be trained and used as leaders or compassmen as the needs of the job may demand.

Eradication results are summarized in table 1.

There were 28 checkers employed during the season but the average number on the job at one time was 18. Their work was maintained at a high standard. Some rework was necessary but all acreage claimed as worked was brought down well below the live stem standard required for protection. Of the total acreage claimed by eradication only 30 per cent required crew work; the balance was eliminated from crew work as being ribes free on the basis of the check. Checking accomplishments for the 1947 season are shown in table 3.

Very little rust was found on sugar pines within the Selma unit. At Hayes Hill in section 19 (T. 37 S., R. 8 W.) 50 infected pines were found along the Redwood Highway. Several large bushes of Ribes sanguineum previously missed by the crews were found in this area. In the Quartz Creek-Tunnel Creek area, which was worked for the first time, considerable infection was found on pines; a few trees were already dead. Bushes of Ribes sanguineum are abundant along the streams in this area, and R. bracteosum was found on two tributaries of Quartz Creek in section 36 (T. 34 S., R. 7 W.). It is not known whether the heavy rains on the first of June and the middle of July caused large amounts of rust intensification on ribes and increased the probability of fall pine infection.

The big demand for lumber has brought about widespread logging in the Selma control unit. Six sawmills are located in this unit of approximately 32,000 acres. In some places the ground cover disturbance has created a ribes regeneration condition that may prove troublesome for several years.

FUNDS EXPENDED

Regular funds expended by the Oregon and California Revested Lands Administration for blister rust control for the calendar year of 1947 were \$113,300.

RECOMMENDATIONS

During the 1948 field season four camps should be operated in the Siskiyou area. Hayes Hill should again be in operation to continue the work in that camp area. A new campsite can be developed between Pickett and Shan Creeks near the River Road to do reeradication work in the Selma and Pickett Creek units and initial eradication in the East Galice unit. Soldier Camp may be occupied for reeradication work in the West Galice unit. Since this area, which was worked in 1942, will be a post checking job principally, only a small eradication crew would be required. The fourth camp planned would be a pack camp at the head of Stratton Creek in the East Galice unit. This camp would continue the initial eradication started in 1947. Much rust is evident in that drainage, and ribes eradication can no longer be delayed without accepting a considerable loss of young pines. A plan for supplying this pack camp should be worked out and a mobile or prefabricated camp unit assembled this winter.

Experience in 1947 brought out the need for the selection, training, and development of more key men for use as crewleaders or subforemen to act as compassmen for advance stringing. They would also be used as scouts in locating scattered ribes bushes and to conduct rework. The success of the one-man crew in areas light in ribes requires that one man in four should be a well trained crewleader. Additional study of the one-man crew system and the dragline is needed to perfect some procedures.

Additional contract eradication work should be encouraged, especially in out-of-the-way areas that are difficult to reach with regular blister rust crews from existing camps.

The work boundaries of the East Galice control unit should be determined as soon as possible, either through a careful inspection of the area or through a systematic pine reconnaissance. It is doubtful whether trained reconnaissance men can be moved into the area early enough next spring to make their information available before the start of the actual eradication work.

The various ribes seedling areas of the Selma unit should be inspected carefully to determine whether regeneration is occurring rapidly enough to warrant reworking before fruiting of the bushes takes place, thus prolonging the rust hazard. Those areas that should be particularly watched are in sections 15, 28, 30, 32, and 34 in T. 37 S., R. 7 W., sections 3, 4, and 5 in T. 38 S., R. 7 W., and section 26 in T. 38 S., R. 8 W.

The continued recruitment of as many laborers as possible from the communities adjacent to the camps should be encouraged. These men recognize what constitutes a day's work and are already familiar with the woods, particularly the area in which they are working. They are a stable group and the labor turnover is far less than among transients or boys of school age. Since they live at home, camp administration is no problem. Through the experience they have gained on blister rust control they are in a position to contribute a public service to their communities in future years both in forestry and allied fields.

More checkers will be needed in 1948 than ever before in order to carry out the program as planned for these areas. The assistance of all groups will be required in securing the number of checkers and the quality of men needed.

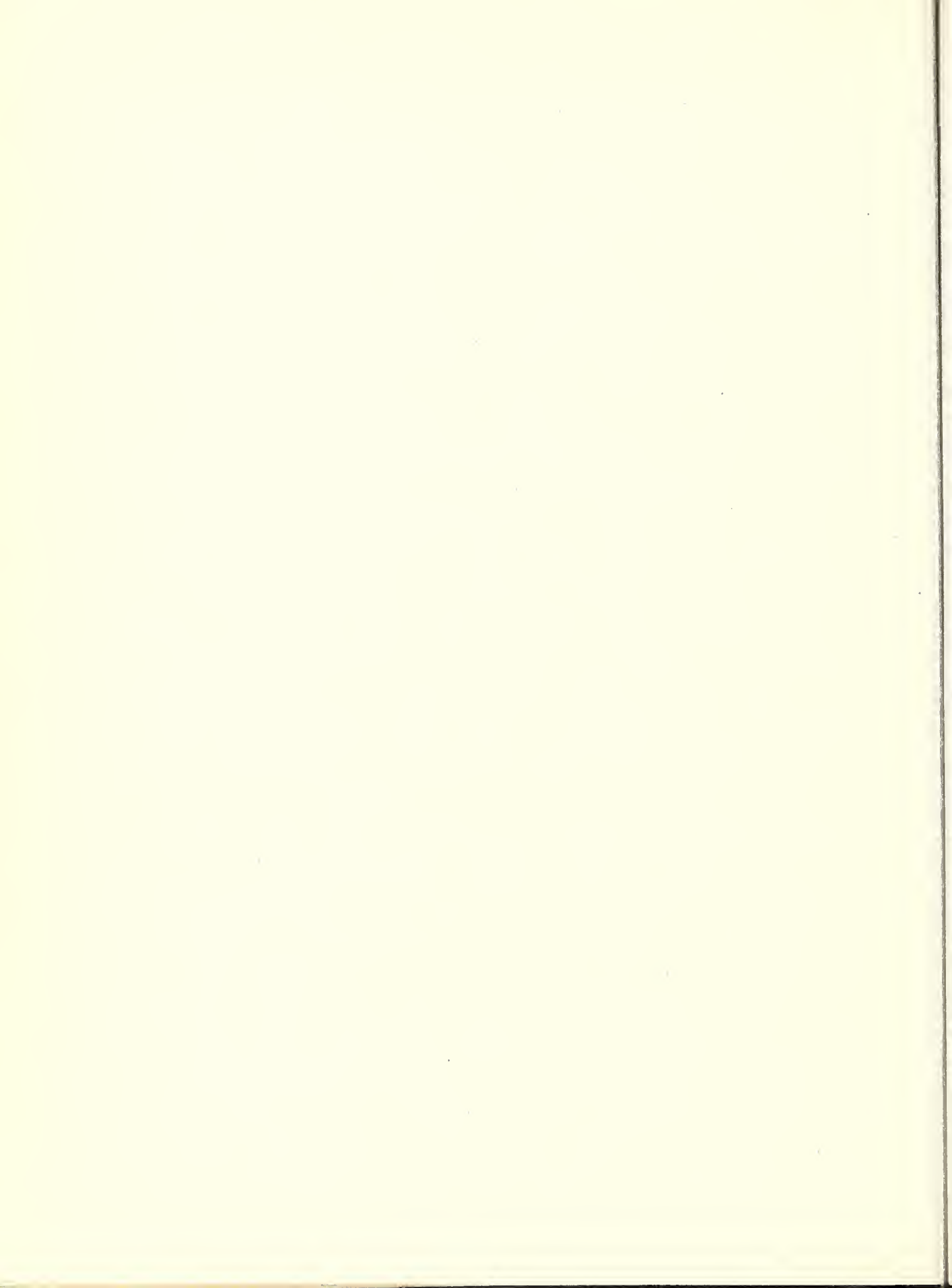


TABLE 1

SUMMARY OF RIBES ERADICATION BY THE OREGON & CALIFORNIA REVESTED LANDS ADMINISTRATION - 1947

Control Operation	Acres		Per Acre Worked	6-Hour Man Days	Ribes Eradicated	Acres Covered				Ownership Statute						Acres Ribes-Free At Re- eradication			
						Federal		Private		Federal		Private		Ribes Eradicated					
	Worked	Blocked Out	Total	6-Hour Man Days	Ribes Eradicated	National Forest	O & C	Total	National Forest	O & C	Total	Private	National Forest	O & C	Total	Private			
Initial Work																			
Shadyon M. F.	2,431	4,365	6,796	985	42,901	0.41	18	80	1,852	1,932	4,864	13	316	329	656	344	8,265	8,609	34,292
Reeradication																			
Shadyon M. F.	7,573		7,573	3,563	197,160	0.47	26	424	2,222	2,646	4,927	181	1,027	1,208	2,355	38,918	15,471	54,889	132,271
All Workings																			
Totals	10,004	4,365	14,369	4,548	240,061	0.45	24	504	4,074	4,578	9,791	194	1,143	1,537	3,011	39,262	24,276	61,498	176,561

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TABLE 2

SUMMARY OF RIBES ERADICATION BY THE OREGON & CALIFORNIA REVESTED LANDS ADMINISTRATION 1940-1947

Control Operation	Acres		Per Acre Worked	8-Hour Man Days	Ribes Eradicated	O w n e r s h i p S t a t u s						Ribes Eradicated Federal		Ribes-Free At Re- eradication				
						Acres Covered		8-Hour Man Days		National Forest						Private		
	Worked	Blocked Out	Total	8-Hour Man Days	Ribes Eradicated	National Forest	O & C	Total	Private	National Forest	O & C	Total	Private					
														Federal	Federal	National Forest	O & C	National Forest
	Initial Work																	
Bogus River M. F.	4,449	1,095	5,544	4,276	301,868	0.96	67		2,344	3,200		2,357	2,357	1,919		185,350	185,350	116,518
Shadyon M. F.	10,223	19,089	29,312	8,720	561,904	0.85	55	9,751	13,315	23,066	6,246	3,133	4,620	7,753	967	208,045	305,793	513,838
Shadyon M. F. Nursery Sanitation	150		150	273	8,339	1.82	56		110	110	40	162	162	111		5,462	5,462	2,877
Totals -	14,822	20,184	35,006	13,269	872,111	0.90	59	9,751	15,769	25,520	9,486	3,133	7,139	10,272	2,997	208,045	496,605	704,650
Reeradication																		
Shadyon M. F.	12,089		12,089	7,933		0.66	23	1,498	5,010	6,508	5,581	1,792	3,527	5,319	2,614	76,213	58,069	134,282
All Workings																		
Bogus River M. F.	4,449	1,095	5,544	4,276	301,868	0.96	67		2,344	3,200		2,357	2,357	1,919		185,350	185,350	116,518
Shadyon M. F.	22,312	19,089	41,401	16,693	641,851	0.75	38	11,249	18,325	29,574	11,827	4,925	8,147	13,072	3,581	204,258	363,862	648,120
Shadyon M. F. Nursery Sanitation	150		150	273	8,339	1.82	56		110	110	40	162	162	111		5,462	5,462	2,877
Totals -	26,911	20,184	47,095	21,202	1,152,058	0.79	43	11,249	20,779	32,028	15,067	4,925	10,666	15,591	5,611	204,258	594,674	838,932

24,117



TABLE 3

SUMMARY OF CHECKING ON THE O & C PROJECT - 1947

Operation	Regular Check			Advance Check			Post Check			All Checks		
	Acres Covered By Final Check	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days	Acres Covered	Per Cent Of Check	Man Days
Siskiyou	9,528	6.7	299.1	8,346	5.6	174.0	30,419	5.6	655.4	48,293	5.8	1,128.5
Totals	9,528	6.7	299.1	8,346	5.6	174.0	30,419	5.6	655.4	48,293	5.8	1,128.5

TABLE 4

ACREAGE OF O & C LANDS WORKED BY ALL AGENCIES
IN THE PACIFIC COAST REGION - 1947

Control Operation	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
Siskiyou	1,852	2,236	21	4,109

TABLE 5

ACREAGE OF O & C LANDS WORKED BY ALL AGENCIES IN THE PACIFIC COAST REGION
AS OF DECEMBER 31, 1947

Operation	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
Rogue River	7,738	-	-	7,738
Siskiyou	34,972	5,176	709	40,857
Klamath	930	139	-	1,069
McKinley Nursery (Siuslaw N.F.)	110	-	-	110
Totals	43,750	5,315	703	49,774

PART VII

SCOUTING AND DISEASE SURVEY

By

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The work of the Scouting and Disease Survey Project was continued during the 1947 season. In addition to scouting for white pine blister rust, Cronartium ribicola, in the Pacific Coast Region, the program included some disease survey work. The aim of the scouting program was the same as that of preceding years, namely: first, to ascertain whether or not a long-distance spread of the rust had occurred from aeciospores produced at northern sources; secondly, to determine the amount of intensification of the disease on pine at those areas previously infected; thirdly, to retard the development and spread of the rust as much as possible by eliminating all cankers located particularly in the outer zone of spread; and fourthly, to collect information on those sites harboring conditions highly favorable to the incidence and development of the rust so that the urgency of each area's need of ribes eradication can be determined. The aim of the disease survey was to learn the extent and intensity of blister rust infection on white pine and to ascertain the effectiveness of control work.

SECTION I - SCOUTING FOR THE RUST

The status of the known spread of white pine blister rust at the beginning of the 1947 season as well as a short history of its spread in the Pacific Coast Region follows:

Oregon

Blister rust was discovered in northwestern Oregon during the summer of 1925. Since then it has spread southward throughout the western white and sugar pine stands of both the Coast and Cascade Ranges. In southern Oregon at locations favorable to rust development, it is not uncommon to find the disease generally present on five-needled pines.

California

Blister rust on both ribes and sugar pine was discovered in California during 1936. At that time, the disease was confined to a narrow belt lying just south of the Oregon line on the Klamath National Forest. Weather conditions during the spring of 1937 and again in 1938 were favorable to aeciospore dissemination as well as to ribes infection, and the rust made a long-distance spread into both the Coast Range and the Sierra Nevada Mountains. By the end of the 1944 season, many blister rust cankers on sugar pine had been found on the southern end of the Plumas National Forest, a distance of about 165 miles south of the Oregon line. Infected ribes had been found along the coast at a point 265 miles south of the

Oregon line as well as on the southern end of the Eldorado National Forest, which is about 240 miles south of the boundary. Weather conditions were not conducive to the spread and development of the disease in 1945 and 1946.

Table 1 presents, by years, the known southward spread of the rust measured in miles from the Oregon line and gives the generic host involved for each of the two sugar pine areas in California.

TABLE 1

ANNUAL SPREAD SOUTHWARD OF BLISTER RUST IN CALIFORNIA

Area	Infected Host	Spread in Miles from Oregon Border										
		1936	1937	1938	1939	1940	1941	1942	1943	1944 1945	1946	1947
Sierra Nevada	Sugar Pine	-	-	-	-	107	165	165	165	165	204	212
	Ribes	-	120	160	160	160	160	160	175	240	240	240
Coast Range	Sugar Pine	4	4	4	14	42	42	42	115	115	121	121
	Ribes	6	125	125	125	125	200	210	265	265	265	310

ORGANIZATION AND METHOD OF WORK

The scouting force, during the active ribes eradication season, consisted of two disease survey crews, one working on the Rogue River and Siskiyou National Forests and the other on the Klamath and Umpqua National Forests. The latter crew was transferred to the Eldorado National Forest August 8 where the members spent the rest of the season scouting for cankers on sugar pine. Although the crews were primarily interested in other work all the data collected were incorporated into the scouting report. The project leader and one assistant spent from July 25 until the second week in October covering the more favorable rust locations from southern Oregon to the Mendocino National Forest in the Coast Range and to the Sequoia National Forest in the Sierras. In addition, members of the Division of Forest Pathology and of the blister rust personnel of all agencies on the various operations both in Oregon and California made observations while performing their regular duties.

The methods used in scouting and the mechanics of performing the work as well as recording the data were the same as those described in the 1942 annual report. The regular disease survey crews were thoroughly trained in disease survey work and as a result were perfectly familiar with the duties of scouting. Locating areas which support conditions favorable to the establishment and development of the rust was again strongly emphasized. The practice of pruning most of the pines examined and of removing all cankers found was continued.

WORK PERFORMED AND RESULTS OBTAINED

Intensive scouting in the Sierras revealed that no long-distance spread of the rust occurred in 1947. Nearly all of the diseased ribes located were within a short distance of sporulating cankers and with one exception no infected bush was found growing farther than a few miles from aecia-bearing cankers. Although blister rust was found on a few ribes bushes

growing in the headwaters of Corte Madera Creek in San Mateo County there was still no positive evidence of a long-distance spread as scouting to the north failed to reveal any more blister rust until the known infection centers on the Trinity National Forest were reached. Since most ribes bushes in the coastal area retain a few leaves throughout the winter it is suspected that the rust made its initial entrance a few years ago and has been overwintering ever since.

An examination of some of the heaviest infection centers on both the Klamath and Siskiyou National Forests in late April revealed the rust making its appearance on the leaves of ribes bushes. The peak of aecio-spore dissemination had passed at elevations below 3,000 feet and from there to snowline (about 5,500 feet) the degree of spore release varied from nearly all gone on the exposed sites to unbroken aecia at the colder locations. Bushes of both Ribes sanguineum and R. cruentum were found to be infected at this time on both forests. Since light rains were occurring it appeared to be a favorable spring for rust development on ribes in the coastal country.

On May 2 the uredial stage of the rust was found on bushes of R. roezli growing at the Indian Creek infection center on the southern end of the Shasta National Forest. Well over half of the aeciospores were gone from the cankers at the time of this visit. Here again a heavy rust year was indicated.

Since there was little late-spring precipitation, infection occurred only on ribes in the vicinity of sporulating cankers and even there the intensification generally was light. After mid-July occasional rains occurred in northern California and southern Oregon and as a result the rust showed heavy intensification throughout the rest of the season. This was particularly true on bushes of R. sanguineum, R. klamathense, and R. lobbi.

White pine blister rust is making rapid intensification on sugar pine in northern California and southern Oregon at those places where the trees grow in close association with bushes of R. sanguineum. An example of this is an area along the road leading from Slater Butte to Tanner Mt. on the Klamath National Forest. Flags caused by blister rust cankers 75 feet or more from the ground can be seen in the crowns of mature sugar pine. During the summer of 1947 from one to ten young sugar pine in a dying condition could be seen from a single spot. Many of these dying trees were infected with so many cankers that their death was caused by limb and twig cankers rather than from the girdling action of stem cankers.

Other evidence of rust intensification on sugar pine is illustrated from data collected by the disease survey crew. The west half of section 32, T. 40 S., R. 1 E., in the Klamath National Forest in southern Oregon, had not been covered by ribes eradication crews at the time pine infection data were collected in 1947. Of the 135 cankers found at one infection center 32 were of 1941 origin, 89 of 1944 origin, and 14 were started in 1945. Since cankers of 1945 origin were just barely visible it is probable that data for that year are not complete. Since rust made its entrance into

this general area in 1937 the infection data show that the rust is intensifying rapidly on pine. The pine infection on this section, when compared to the rust found on pine a few miles farther south, is rather light in intensity.

Another example depicting the build-up of the rust on sugar pine in unworked areas is the Coffee Pot unit of the Umpqua National Forest. None of this area had been given protective treatment before 1947 and during that season 3,790 acres were sampled by the disease survey crew. Of the 2,477 cankers found 62 represented the initial infection occurring in 1937, 1,937 cankers originated in 1941, 142 had their origin in the years of 1942 to 1943, 302 originated in 1944 and 34 started in 1945. Again the cankers of 1944 and 1945 origin were difficult to detect because of their immaturity; hence, some were probably overlooked.

The area (section 5, T. 37 S., R. 4 E.) harboring the heaviest pine infection encountered by the disease survey crew while working the Fish Lake unit on the Rogue River National Forest had sugar pine and Ribes sanguineum growing in association near the south quarter corner. The rust made its entrance into this area about 1937 and the number of cankers, on the area examined, had increased from 32 to 2,290 at the time of examination. About 70 per cent of these cankers originated in 1941 and most of the remainder started in 1944. Of the 1,500 young sugar pine examined, 508 or about 34 per cent were found to be infected. This is the heaviest infection for an entire section yet found in northern California and southern Oregon.

The areas just described are some of the worst in the Pacific Coast Region as far as rust damage is concerned, but there are hundreds more of these areas outside the worked areas. In nearly all of these cases bushes of R. sanguineum caused the heavy pine infection. The reasons that this species is so much more damaging than most other ribes are: it is one of the two species most susceptible to blister rust, it occurs on far more area in the white pine belt than does the other highly susceptible species (R. bracteosum), the rust intensifies to a greater extent on its leaves than on the leaves of other ribes, the leaves remain on the bushes in the fall as long or longer than do the leaves of other species, and when the leaves become infected the rate of defoliation is hastened to a less degree than is the case with most other species.

White pine blister rust is not building up nearly so rapidly on sugar pine in the Sierras as it is in northwestern California and southern Oregon. This lack of rapid intensification on pine is probably due to ribes species that are less favorable for returning the rust to pine and to generally drier summer and fall seasons than are found farther north.

The rust was found on ribes as far south as the Lassen National Forest in 1937. Another spread year occurred in 1938 in the Sierras and ribes infection was found at numerous points throughout the Shasta, Lassen, and Plumas National Forests. The rust made its first general spread in southern Oregon and the lower Klamath country in 1937. For comparison the rust entered both the Sierras and the southern Oregon

country at about the same time. Scouting in southern Oregon and on the Klamath National Forest in California reveals the rust to be well entrenched at all favorable sites. At those sites harboring either Ribes bracteosum or R. sanguineum the rust has intensified to such an extent on sugar pine that many of the young trees are already dead. Disease surveys revealed that where no control work has been performed the infection varies from nearly nothing to 34 per cent. Survey data are taken along a mile-long strip and crosses ridge tops (less favorable rust sites) as well as valleys.

Scouting in the Sierras has been mostly confined to stream type, meadows, etc., that harbor the most favorable conditions for the incidence and development of the rust. When an infection center is found the whole area is searched, thus the heaviest pockets of rust are covered and the required data are taken. One very heavy infection center and only one has been found on the Shasta, Lassen, and Plumas National Forests. This center is at Indian Creek in the southern portion of the Shasta National Forest. The total number of infected pines found on these three forests through 1947 was 1,825 and of these 961 came from the one center at Indian Creek. There have been 56,423 sugar pine trees examined in searching for infection from 1941 to 1947 of which 3.2 per cent were infected.

Actually, hundreds more sugar pine trees have been examined for rust by members of the ribes eradication forces, but since no cankers were found no record was made. The total number of infected pines is probably correct as each newly found center was immediately reported. If the data for the Indian Creek center are eliminated there would be 54,962 trees examined on these three forests of which 864 or 1.6 per cent were infected.

A comparison of the number of infected sugar pine present at the most favorable spots by forests is of interest. A total of 22,960 sugar pine trees have been examined on the Plumas National Forest (1941-1947) and 209 or 0.9 per cent were cankerous. Of the 29,186 sugar pine examined on the Lassen National Forest since the first canker appeared 454 trees or 1.5 per cent were infected. Most of the scouting on the Shasta National Forest has been done around Indian Creek on the east and in the Damnation-Clear Creek drainage on the west. Both of these areas support pine-infection centers. Scouts have examined 4,275 sugar pine trees and found cankers on 1,162 which is 27 per cent of the total inspected. This percentage is out of line with that of other forests. Enough scouting has been done to show that the rust is not generally present over the forest and that only one heavy rust spot exists. The data from this one center (Indian Creek) is enough to influence all other data collected for the forest. If the Indian Creek figures were removed from the forest total there would be 2,814 trees examined of which 201 or 7.1 per cent were infected.

When figures for the Klamath and southern Oregon country are reviewed we find that the rust is more firmly entrenched there than in the eastern sugar pine belt of California. There have been 62,280 sugar pine trees examined on the Klamath National Forest and of this number 14,685 or 24 per cent were cankerous. Scouting during the last two years has consisted mostly of the work done by the disease survey crews. The crew samples the entire area and not just along the most favorable sites hence the 24 per cent for this forest is low when compared to the percentages of infection for the forests in the Sierras.

An exaggerated effect of the influence of disease survey data on the regular scouting data is illustrated by the information taken on the Siskiyou National Forest. Men doing scouting work examined 11,451 young sugar pine trees of which 1,237 or 10.8 per cent were infected. The disease survey crew examined 17,844 trees during 1947 and found 179 or 1.01 per cent to be diseased. When the figures are combined they show that 4.8 per cent of all trees examined were infected. The disease survey data collected on the Rogue River National Forest had less influence on the scouting data than it did on most other forests. The scouting data show 12.2 per cent pine infection while all data showed an infection per cent of 10.0. The scouting and disease survey data on the Umpqua National Forest revealed almost identical percentages of infected sugar pine. Scouting showed 11.7 per cent and the disease survey had 11.5 per cent of the trees diseased.

Climatic and other factors necessary for rust development on sugar pine appear to be present at more locations north of the Rubicon River on the Eldorado National Forest than on forests farther north. The rust made its entrance for the first time on ribes in 1944 and a few cankers were found in 1946. In 1947 the most favorable rust locations on the north end of the forest received rather thorough coverage and as a result several new rust pockets were discovered. Nine infected sugar pines were found in 1946 and 309 were located in 1947. In the two years 10,509 sugar pine were examined and 318 of these had cankers. This is a greater number of infected trees than the total of 209 found on the Plumas National Forest to date. It is also 70 per cent of the 454 infected trees that make up the total for the Lassen National Forest.

Some time was spent scouting for the rust on the Tahoe National Forest. Rust on ribes was discovered for the first time in 1943 and on pine in 1946. Only one additional infected pine was found in 1947 and all the rust found on ribes proved to be pinyon rust.

The above results indicate that the area lying between the Rubicon and Middle Fork of the American Rivers on the north end of the Eldorado National Forest is one of the most rust hazardous areas yet encountered in the Sierras. Because of this hazardous condition this area must be carefully watched in the future to prevent the rust from getting out of hand.

Scouting on the Stanislaus, Sierra, and Sequoia National Forests and the Yosemite, Kings Canyon, and Sequoia National Parks revealed a light spread and intensification of pinyon rust. No blister rust on either group of hosts was found on any of these operations. Scouting on the Mendocino and Trinity National Forests revealed pinyon rust for what is believed to be the first time. The three rust samples, all on Ribes lobbi, collected from the Mendocino National Forest were identified as pinyon rust. One of the several rust samples on ribes leaves sent in for identification from the Trinity National Forest was determined to be pinyon rust. This rust was found on a bush of R. binominatum. There was more rust on ribes on the Trinity National Forest during the fall of 1947 than previously had been seen there. Pinyon rust was also found on ribes on both the Lassen and Plumas National Forests.

An infection center involving western white pine was found beside the Slater Butte-Tanner Mt. road in the western portion of the Klamath National Forest. This area is composed of the ridge between Thompson Creek and the East Fork of Indian Creek and lies about two miles south of the Oregon line. This is probably the first time cankers have been found on western white pine in California.

A scouting trip with pack stock was made through the southeastern part of the Klamath National Forest and cankers were found wherever sugar pine and bushes of Ribes sanguineum grew together. The rust was generally light in intensity except beside Fish Lake Creek. At this site numerous thrifty young sugar pine trees were growing at the edge of an old burn and bushes of R. sanguineum were growing nearby. As a result about one-half of the pine on an area of 10 to 20 acres was infected.

Scouting on the Umpqua and Rogue River National Forests revealed a few more bushes of R. cereum to be lightly infected with blister rust. All of these bushes were growing in heavily diseased pine stands. Numerous bushes of R. cereum on an area at a distance of about two miles from the Watson Creek infection center (where nearly all of the infected bushes of this species have been found) were examined and no rust was found. Every bush of R. cereum infected under natural conditions that has been found so far in the Pacific Coast Region has been growing beneath heavily cankerous pines. The data collected during 1947 add further proof that bushes of this species are practically immune to white pine blister rust.

A summarization by forests and parks of the number of each host found to be infected is presented in table 2. The examination of ribes bushes for blister rust constituted most of the work performed by the scouts. Numerous pines, however, were examined in the outer zones of infection particularly on the northern end of the Eldorado National Forest. All cankers south of the Indian Creek center on the Shasta National Forest were removed. Of the 57,661 white pines examined 3,452 were infected with 15,023 cankers. There were 30,996 ribes bushes inspected and 1,319 of these had blister rust and 353 more were infected with pinyon rust.

Since the ranges of the two rusts now overlap in the Sierras and Coast Range all rust specimens found on ribes within this area must be collected and submitted for laboratory determination. When a patch of infected bushes was found only a few samples were collected but samples of rust were taken from all individual and small groups (up to about 10 infected bushes) of rusted bushes when found in the overlapping range of the two rusts. During the 1947 season 320 samples from the numerous rusted bushes found were sent in for identification.

SUMMARY

A resume of the scouting season follows:

1. There was no general long-distance spread of the rust in California from aeciospores produced at northern sources.

2. Climatic conditions during the early summer were generally unfavorable for intensifying the rust on the leaves of ribes bushes. Light rains occurring from mid-July on in northern California and southern Oregon resulted in heavy intensification of the rust on ribes leaves throughout the remainder of the season.
3. Pinyon rust was more widely spread than usual but was generally light in intensification. It was found for what is believed to be the first time on both the Mendocino and Trinity National Forests. Bushes of Ribes lobbi were the host plants on the first and R. binominatum the host on the latter forest.
4. The build-up of the rust on pine at the Sierra infection centers, with the exception of the Indian Creek center on the Shasta National Forest, is still extremely light. This indicates that damage to pines from blister rust will be much slower in the Sierra sugar pine belt than has been the case on the Klamath National Forest and southern Oregon.
5. Infection data collected during 1947 strengthen the hypothesis that nearly all pine damage in southern Oregon and northern California is caused by bushes of R. sanguineum.
6. Climatic and other factors necessary for rust development on sugar pine appear to be more favorable and to be present at more locations between the Rubicon River and the Middle Fork of the American River on the Eldorado National Forest than on forests farther north in the Sierras.
7. The cankers found on sugar pine beside Pilot Creek on the Eldorado National Forest extend the known pine infection about eight miles farther south.
8. The rusted ribes located in the headwaters of Corte Madera Creek in San Mateo County extended the known range of rust on ribes about 45 miles farther south in the Coast Range.
9. Blister rust cankers were found for the first time on western white pine. This infection center was on the western portion of the Klamath National Forest.
10. Nearly all blister rust cankers were removed when found. Infection centers south of the Shasta National Forest were scouted intensively in an effort to eliminate all cankers. During the summer 57,661 white pine trees were examined and 15,023 cankers were removed from 3,452 trees.

TABLE 2

SCOUTING RESULTS FOR THE PACIFIC COAST REGION - 1947

National Forest or Area	Ribes			White Pines				
	Examined	*Infected With		Examined	Infected	Cankers		
		BR	PR			Stem	Limb	Total
Oregon								
Umpqua	467	330	-	330	9,459	441	2,606	3,047
Crater Lake National Park	504	12	-	12	200	-	-	-
Rogue River	7,395	252	-	252	9,073	649	3,108	3,757
Siskiyou	127	92	-	92	17,918	106	554	660
Klamath	435	119	-	119	2,270	22	144	166
Total for Oregon	8,928	805	-	805	38,920	1,218	6,412	7,630
California								
Klamath	1,101	231	-	231	3,792	465	6,047	6,512
Trinity	502	64	1	65	51	1	10	11
Mendocino	1,864	-	3	3	189	-	-	-
Shasta	119	3	-	3	185	22	90	112
Coastal Area	70	5	-	5	-	-	-	-
Lassen	421	10	1	11	189	2	4	6
Plumas	1,821	127	12	139	2,341	3	147	150
Tahoe	2,304	-	20	20	766	1	1	1
Eldorado	4,161	74	62	136	9,632	15	586	601
Stanislaus	3,225	-	136	136	575	-	-	-
Sierra	2,755	-	98	98	525	-	-	-
Yosemite National Park	376	-	3	3	112	-	-	-
Sequoia	2,659	-	15	15	269	-	-	-
Sequoia National Park	200	-	-	-	55	-	-	-
Kings Canyon National Park	490	-	2	2	60	-	-	-
Total for California	22,068	514	353	867	18,741	1,109	6,885	7,393
Total								
Pacific Coast Region	30,996	1,319	353	1,672	57,661	3,452	13,297	15,023

* BR = Blister Rust

PR = Pinyon Rust



SECTION II - PINE DISEASE SURVEYS

An intensive disease survey on some of the heaviest rusted areas within control unit boundaries was made in the Cottonwood unit of the Klamath National Forest. Surveys were also conducted on the Coffee Pot unit of the Umpqua National Forest, on the Fish Lake unit of the Rogue River National Forest, and in the Quartz Creek unit of the Siskiyou operation. Nearly all of the Cottonwood unit had already received protective treatment, so, the disease survey was made to determine; first, the amount of rust present on the sugar pine and, secondly, to determine the effectiveness of control measures as applied. Ribes eradication work was being started for the first time at the Coffee Pot and Quartz Creek areas and the survey was made at the heaviest rusted areas to determine the amount and percentage of sugar pine infection. The Fish Lake unit was only a proposed unit and disease survey data were collected while the area was being covered by the reconnaissance crew, so that this information would be available when final plans were being made for the disposition of these lands.

ORGANIZATION AND METHODS OF WORK

Two disease survey crews were organized, trained, and started to work in June. A six-man crew was attached to the reconnaissance camp on the Fish Lake unit of the Rogue River National Forest. A disease survey man worked with a reconnaissance man forming a two-man party. This practice didn't retard the progress of either man but it had the advantage of making the number of disease surveyors go twice as far because they would have had to work in crews of two had the reconnaissance party not been there. Since the Fish Lake area was only a tentative unit the number of strips run per section was limited to four on all but one section. An extremely heavy infection center was encountered on that one section and since some sugar pine was growing in association with the western white pine further information was desired.

The reconnaissance work was completed during the latter part of July and the entire crew was moved to the Quartz Creek unit which lies east of but adjacent to the Siskiyou National Forest. The twelve men worked on disease survey for two and one-half weeks before the project was terminated. Since the ribes eradication crews were doing initial work on this area, eight disease survey strips were run in each section to get a better sample of rust conditions present.

The second disease survey crew was trained on the Cottonwood unit of the Klamath National Forest. After a few sections of the heaviest rusted areas had been covered the crew was transferred to the Coffee Pot unit of the Umpqua National Forest. Initial ribes eradication work had just been started so eight strips per section were run to give adequate information on the amount of infection present.

The work of this crew was terminated in August as the members were needed more urgently on scouting elsewhere.

The section was used as the basic land unit. On all but the Fish Lake unit eight parallel strips one-fourth chain wide were run at regular intervals in a cardinal direction. Distances were measured by pacing and

courses were followed by use of a box compass. A two-man party was used; one man ran compass, paced, searched for ribes bushes, and recorded all data; the other examined all pines under 20 feet in height for cankers and called out information when a diseased tree was located.

The data were recorded by five-chain transects. The number of ribes and feet of live stem were recorded by species and a notation made when a bush was found to be infected. The number of pines examined, infected trees located, and cankers found were recorded. Cankers were listed as nearly as possible by year of origin. Emphasis was placed upon an accurate tree count and thorough examination. To aid in this the compassman dragged a heavyweight piece of cord so that the tree inspector would have a definite center line from which to measure the boundaries of the strip. Nearly all of the smaller white pines growing on the strip were pruned to aid in locating the cankers.

WORK PERFORMED AND RESULTS OBTAINED

The disease survey crew sampled 2,206 acres on the Klamath National Forest by running 29 miles of strip. There were 4,777 trees (82.4 trees per acre) examined and of these 267 or 5.6 per cent were infected. Each diseased tree averaged less than three cankers. An average of twenty-three feet of ribes live stem was found for each canker.

The area covered on this forest indicates that the ribes eradication work performed in the past has been a big help in retarding the build-up of the rust on sugar pine. Section 32, T. 40 S., R. 1 E., lying just outside the heaviest rust zone, can be used as an example. The east half of this section was worked initially in 1939 and a survey made during 1947 showed only four cankers on four miles of strip in this portion while the unworked west half had 131 cankers.

The rest of the 2,206 acres sampled in this unit had received protective treatment during 1940 and 1941. A total of 637 cankers was found on the remaining 1,566 acres and of these only 19 had originated since the initial eradication work was performed. Of the 131 cankers found in the unworked portion of section 32 a total of 103 had originated in 1944 and 1945. Stating these amounts in terms of percentages 78.6 per cent of the cankers found on the 320 untreated acres had originated between 1942 and 1945. For the 1,886 acres sampled within the treated area less than 3 per cent of the cankers started between 1942 and 1945.

There were 4,480 acres sampled by the disease survey crew on the Siskiyou National Forest. A total of 56 miles of strip was run and 112 strip acres covered. Of the 17,844 trees examined only 179 or 1 per cent were infected. This area supported few bushes but most of these were Ribes sanguineum. Only 6.3 feet of live stem were found per acre and 1.2 feet per blister rust canker.

The survey in the Fish Lake area of the Rogue River National Forest revealed the rust to be confined to the streams and to those areas supporting bushes of R. sanguineum. On all but one section only four strips per section were run while sampling the 27,700 acres covered. Since the pine population generally was light only 9,149 trees were

examined on 354 strip acres or an average of only 26 trees per acre was found. About 11 per cent of the trees examined were found to be diseased. The pine on one section was very heavily rusted and over half of the cankerous trees found in the entire area occurred there. Trees of both sugar and western white pine were rather numerous on this section which averaged 188 stems per acre and of these 63.5 trees or nearly 34 per cent were infected.

There were 3,790 acres examined on the Umpqua National Forest by taking data on 47-1/2 miles of strip. Of the 9,360 trees occurring on the strips 1,036 or slightly over 11 per cent were found to be infected. There was an average of 98.5 trees per acre and 10.9 of these were cankerous. This area supports a light ribes population. Only 2.4 ribes bushes per acre were found but of these nearly one-half were Ribes sanguineum. Most of the ribes found (84 per cent) were rusted. Bushes of R. cruentum showed the highest percentage of infection, 97.9 per cent, while R. sanguineum was next with 81.0 per cent. Ribes sanguineum was the heaviest infected species on each of the other forests.

During the 1947 season the disease survey crews working on the four forests sampled 38,176 acres, taking data on 309.5 miles of strip containing 619 strip acres. There were 41,130 sugar and western white pines examined, 2,455 of which were found to harbor 7,617 cankers.

An analysis of the cankers showed that 4.0 per cent originated at the time of the rust's original entrance in 1937. A few of the 1937 cankers sporulated in 1940 and this resulted in only 0.5 per cent of the total number of cankers found. Most of the 1937 cankers sporulated in 1941. When the favorable weather conditions, which occurred throughout the summer, were coupled with this increased and evenly distributed sporulation, heavy ribes infection resulted. The outcome of so many rusted ribes was the start of numerous cankers on pine scattered throughout the white pine stands of southern Oregon and northern California. The survey revealed that 72.2 per cent of all cankers found had their origin during the fall of 1941. Only 2.6 per cent of the cankers were of 1942-1943 origin. Another wave of rust on ribes occurred in 1944 which ended up in producing 19.3 per cent of the cankers. Cankers of 1945 origin were rather immature, hence were difficult to find, but 1.4 per cent of the cankers found were of that year's origin.

Table 1 summarizes the pine and ribes data while table 2 presents these same data on the acreage basis. Ribes data by species are shown in table 3 and ribes infection data are contained in table 4.

Table 5 presents canker data showing the year of origin of the cankers and the corresponding percentage for each year.

TABLE 1

DISEASE SURVEY DATA - SUMMARY 1947

Forest	Acres Sampled	Pine Data			Ribes Data		
		Trees Examined	Trees Infected	Total Cankers	Bushes Examined	Bushes Infected	Total FLS
Umpqua	3,790	9,360	1,036	2,477	230	193	4,602
Rogue River	27,700	9,149	973	3,757	7,295	226	84,410
Siskiyou	4,480	17,844	179	611	45	10	710
Klamath	2,206	4,777	267	772	499	171	17,862
Totals	38,176	41,130	2,455	7,617	8,069	600	107,584

TABLE 2

DISEASE SURVEY DATA ON ACRE BASIS - 1947

Forest	Strip Acres	Pine Data Per Acre Basis				Ribes Data Per Acre Basis			Average FLS Per Canker
		Trees Exam.	Trees Inf.	% of Trees Inf.	Total Cankers	Bushes Exam.	Bushes Inf.	Total FLS	
Umpqua	95	98.5	10.9	11.1	26.1	2.4	2.0	48.4	1.9
Rogue River	354	25.8	2.7	10.6	10.6	20.6	0.6	238.4	22.5
Siskiyou	112	159.3	1.6	1.0	5.5	0.4	0.1	6.3	1.2
Klamath	58	82.4	4.6	5.6	13.3	8.6	2.9	308.0	23.1
Totals	619	66.4	4.0	6.0	12.3	13.0	1.0	173.8	14.1

TABLE 3

NUMBER OF RIBES AND FEET OF LIVE STEM FOUND BY SPECIES BY FOREST - 1947

Forest	Ribes by Species															
	lobbi		cruentum		sang.		lacustre		cereum		visco.		klam.		binom.	
	No.	FLS	No.	FLS	No.	FLS	No.	FLS	No.	FLS	No.	FLS	No.	FLS	No.	FLS
Umpqua	12	100	96	3,264	105	982	7	12	-	-	-	-	10	244	-	-
Rogue River	1,243	29,366	29	2,759	310	4,958	1,677	16,670	28	1,129	1,119	6,764	-	-	2,889	22,764
Siskiyou	-	-	-	-	43	675	-	-	-	-	-	-	2	35	-	-
Klamath	118	1,655	70	2,677	154	7,522	155	5,831	-	-	2	177	-	-	-	-
Totals	1,373	31,121	195	8,700	612	14,137	1,839	22,513	28	1,129	1,121	6,941	12	279	2,889	22,764
															8,069	107,584

TABLE 4
PER CENT OF INFECTED BUSHES BY RIBES SPECIES

Forest	Ribes by Species								
	lobbi	cruent.	sant.	lacust.	cereum	visco.	kiam.	binom.	Total
Umpqua	25.0	97.9	81.0	14.3	-	-	100.0	-	83.9
Rogue River	7.3	-	13.5	3.0	-	3.3	-	0.2	3.1
Siskiyou	-	-	23.3	-	-	-	-	-	2.2
Klamath	33.1	48.6	55.8	7.7	-	-	-	-	34.3
Totals	9.7	65.6	36.4	3.4	-	3.3	83.3	0.2	7.4



PART VIII

BLISTER RUST CONTROL RECONNAISSANCE

By

Douglas R. Miller, Pathologist

INTRODUCTION

The blister-rust-control reconnaissance program was continued during the 1947 season. The purpose of this project is to collect sufficient timber and ribes data on certain lands so that the expected yield of sugar or western white pine growing thereon can be ascertained. With this information the disposition of these areas, from the blister rust control standpoint, can be made. For those areas supporting enough white pine to warrant protective treatment the reconnaissance data can further be used in planning ribes eradication work. Generally, areas requiring this type of work are those on which insufficient data are available as well as those areas on which the existing information has become obsolete because of logging or fire.

The Bureau of Entomology and Plant Quarantine organized three eight-man parties, one each on the Rogue River, Lassen, and Plumas National Forests. In addition two men were attached to a checking camp working on the Tahoe National Forest and four men divided their time between the Eldorado and Stanislaus National Forests. The starting dates of the camps varied from May 19 to June 16 and the first week of September found most of the work terminated because the men were quitting to return to school.

METHODS OF WORK

The methods used in performing reconnaissance work in 1947 were the same as those described in the 1946 annual report. The section was used as the basic land unit. Four parallel strips were run at regular intervals in a cardinal direction. Distances were measured by pacing and courses were followed by use of a box compass. The strips were run as nearly at right angles to the main drainages as a cardinal direction would permit so that the area covered by the strips would be more representative of the entire area than would be the case if strips paralleled the principal streams.

Each man worked alone and, while running a strip, counted the ribes by species on a strip of area one-fourth chain wide and recorded them by five-chain transects. He stopped at ten-chain intervals, laid out a one-tenth acre circular plot and counted the white pine trees. As each pine was counted it was recorded in its respective place in one of the following four size classes: 0 - 6 feet in height, 6.1 feet in height to 3.5 inches DBH (diameter breast high), 3.6 inches DEH to 11.5 inches DEH, and over 11.5 inches DBH.

Associated tree species for each plot were listed in the order of their numerical predominance; however, no counts were made. Two maps of the section were made as the reconnaissance man proceeded with his other work.

One map showed the cultural and topographic features, site class boundaries, and the boundaries of the four yield expectancy groups for white pine stands. The second map showed the density of the brush and young trees as well as the brush species composing the ground cover.

The method of handling and applying the timber data after they were collected was the same as that used in 1946.

LOCATION AND DESCRIPTION OF AREAS

The blister-rust-control reconnaissance work of 1947 was performed in both Oregon and California at those places where immediate information was needed by the ribes eradication forces. Most of the work was performed on those areas adjacent to and within existing control units.

OREGON

Although most of the acreage covered by reconnaissance crews was on the Rogue River National Forest there were a few sections sampled on the Siskiyou National Forest.

Rogue River National Forest

A combination reconnaissance and disease survey camp was established beside the South Fork of Little Butte Creek in the Fish Lake area in early June. This area lies in the southeastern part of the Forest and supports some western white pine in mixture with white fir, Douglas fir, hemlock, lodgepole pine, and ponderosa pine along with a few other tree species. Two small pockets of sugar pine were found in the vicinity of Robinsons Butte.

The Fish Lake area is of gentle terrain with an occasional canyon caused by the streams cutting their way through the upper pumice deposits down to the lava cap. In places the edges of ancient lava flows show as a mass of jumbled boulders forming a lava rim on which there was no merchantable timber.

Most of the area supported light brush densities but as the slopes of a few hills were encountered the brush became very thick. The seven species of ribes found listed in order of their predominance are: Ribes binominatum, R. lacustre, R. lobbi, R. viscosissimum, R. sanguineum, R. cruentum, and R. cereum. White pine blister rust infection on western white pine was generally light with the exception of a few small areas. Most of the young pine trees in one of the sugar pine pockets were heavily cankered as large bushes of R. sanguineum were scattered throughout the area. Many small pines three feet or less in height were either dead or dying.

Reconnaissance data were taken on a few sections in the vicinity of Rustler Butte which is about 12 to 15 miles north of the Fish Lake area.

Work was done on these two areas to determine whether or not there is enough white pine present to warrant the cost of control treatment. It was found that the pine occurred in belts and patches and that generally white pine made up only a small portion of the volume of timber present.

Siskiyou National Forest

Toward the end of the season a few sections in the Hayes Hill area were covered to determine the amount of young sugar pine left on the ground after logging. This area is situated inside control unit boundaries just north of Selma in the southeastern portion of the forest.

The sugar pine on the part of the unit covered is of good quality and is making rapid growth. The topography of the land is gentle with fertile belts along the streams. The best of the land is under cultivation and timber occupies the slopes between the agricultural areas.

Generally there are few ribes per acre in this part of the unit. Dense patches of Ribes klamathense were found along a few of the streams but away from the streams only an occasional bush of R. sanguineum, R. cruentum, or R. lobbi was found. A few small centers of blister rust on sugar pine were located.

CALIFORNIA

Three reconnaissance parties of six men each were trained for work in California. Work was performed on six forests, the amount covered ranging from about 1,000 acres to over 55,000 acres.

Lassen National Forest

Reconnaissance work was started on the Lassen National Forest in late May and continued until early September. During this time a crew of from three to seven men worked small areas adjacent to large blocks of timber that were scattered from Soda Springs on the south to Latour Butte on the north. Since the work was scattered throughout most of the sugar pine belt on the forest it was done in all degrees of topography from level to extremely steep canyon walls and high ridges.

Nearly half of the total acres covered had enough sugar pine present to justify further consideration from the control standpoint.

The brush was generally light except in the vicinity of Lake Almanor and the Latour Butte areas. At these sites it was more dense on the average than for areas covered elsewhere in the forest.

The three species of ribes found on the area were R. roezli, R. nevadense, and R. inerme. The first of these species accounted for nearly all of the bushes present while the latter species represented a very small number on the entire area. In general, ribes were few as the average per acre was only about 17.

Plumas National Forest

A reconnaissance party was organized and started work on this forest in early June. Most of the data taken by this crew were on sections located around the edges of the main sugar pine stands or on sections within control unit boundaries on which logging had occurred. These sections were scattered from the South Fork of the Feather River on the south to

Lake Almanor on the north. Since the work was so widely distributed most types of topography were encountered. A few sections in the north were comparatively level while at other places the area worked was composed of canyons and ridges. Although sugar pine is generally scattered throughout the timbered area of the forest the better or commercial stands are confined to belts or pockets. Since much of the work performed during the 1947 season was in areas adjacent to the better sugar pine stands and practically all of the remainder had been recently logged, no large block of continuous pine type was found within the area covered. Much of the area worked during 1947 lies within blister-rust-control unit boundaries and had already received protective treatment, but because of recent logging the pine stocking was reduced to such a point that it was questionable whether enough remained to warrant further protection costs. Only 20,800 acres of the 55,560 covered by reconnaissance had enough sugar pine present to justify further consideration for protection against white pine blister rust.

There were five species of ribes found and these listed in the order of their abundance are: Ribes roezli, R. nevadense, R. inerme, R. viscosissimum, and R. cereum. There was little difference between the average number of ribes found on cut-over areas and on areas supporting mature timber. Since all areas support an average of 26 bushes per acre they fall within the light concentration classification.

The brush density was generally light on the country worked, however, a few sizable areas were worked that supported a thick brush canopy.

Tahoe National Forest

A combination reconnaissance and checking crew started work on the Brandy City unit during the last week of June. There were only two men assigned to reconnaissance but they covered 12,220 acres, all but 320 of which were federally owned.

The Brandy City unit is located on the north end of the Tahoe National Forest. It is bounded on the north by Canyon Creek which is also the boundary of the forest and on the south by the break into the canyon of the North Fork of the Yuba River. The center of the unit lies on a high, level ridge top, but the north and south portions break over into rough steep canyons. In addition to the two main drainages the area is further broken up by numerous smaller streams and intervening ridges.

At one time this area supported a good stand of timber with sugar pine constituting a high percentage of the stand. Like most other sugar pine areas the early settlers cut many of the choice trees for their numerous uses and this procedure has reduced the amount of pine present. Also, severe fires have denuded large blocks and brush has taken these areas. This is particularly true around Sugar Loaf.

The Brandy City unit is up for logging and about 2,000 acres have had the timber removed during the past two or three years.

Sugar pine grows in association with ponderosa pine and incense cedar on the south facing slopes. It occurs with Douglas fir in the lower-elevation canyons and with white fir on most of the north slopes within its altitudinal range. At the upper limit of the sugar pine range red fir comes into the stand.

The Brandy City unit as a whole is a good growing site for timber since most of it falls within Forest Service designated sites I-175 and II-150 or in site classes A and B as used in blister rust work. The brush on this area is slightly denser than the average for work done on other forests.

There was a wide variation in the number of ribes per acre growing on the different portions of the unit. Ribes information was collected by the checkers on 11,884 acres. It was found that 1,036 acres supported less than 25 feet of live stem per acre, 2,443 acres had more than 25 feet of live stem but less than 30 bushes per acre, 5,104 acres harbored from 31 to 150 bushes per acre, 2,816 acres supported from 151 to 1,000 bushes per acre, and 485 acres supported a concentration of ribes exceeding 1,000 bushes per acre. Nearly all of these bushes were Ribes roezli, although bushes of R. nevadense made up about one per cent of the total.

Scouting failed to reveal any ribes infected with blister rust in this unit and only one infected sugar pine with one non-sporulating canker was found.

Eldorado National Forest

A crew of four reconnaissance men, trained in late June, divided their time between this forest and the Stanislaus National Forest. Their work, although confined to sections situated adjacent to the main sugar pine stands and to sections on which the pine values were questionable after the mature timber had been cut, was scattered from one end of the forest to the other. Data were collected in the vicinities of Tiger Creek, South Fork of the Cosumnes River, Beanville Meadow, Silver Fork of the American River, Bark Shanty Ravine, Dry Lakes, Pilot Creek, and Long Canyon.

Most of the area worked had a light cover of brush; however, the portion in the Long Canyon country supported a brush cover of medium density. Ribes populations were generally light except in the Long Canyon unit where concentrations vary from about 50 to 200 bushes per acre.

There was a wide variation in timber growing conditions on the areas covered by the reconnaissance crews. The southernmost portion of Tiger Creek was on a long south-facing slope where ponderosa pine was the chief associate of sugar pine. Here brush density was very light and ribes few. The other extreme was in the north end of the forest in the vicinity of Long Canyon.

The best sugar pine sites in the Long Canyon country are of high quality and much of these good sites support excellent sugar pine growing in mixture with white and Douglas fir. These good sites, however, are not continuous but are broken up by steep canyon walls of poor site qualities. The sugar pine stands on the better growing sites have been disrupted by ancient fires which left only brush fields in their wake.

Stanislaus National Forest

Most of the reconnaissance work on the Stanislaus National Forest was confined to those portions of control units which had been cut over since initial ribes eradication work was performed. Since the advisability of doing further work on some of the logged-over areas was questionable, a reconnaissance survey was needed to determine whether or not the areas supported enough sugar pine to warrant additional protective costs.

As was the case on most of the other forests the work was performed on numerous small areas scattered throughout the sugar pine belt of the forest. Sections were sampled in the vicinity of Carl Inn, Rosasco, Strawberry Lake, Cow Creek, Dorrington, and Hinklemans.

The brush was generally light in density although an occasional patch of thick manzanita was encountered. Since most of the area had been worked the ribes population was very light with a few exceptions. These exceptions occurred where ribes regeneration was exceedingly heavy following the disturbance caused by logging and where no protective work had been done since the removal of the timber.

Latour State Forest

Reconnaissance data were taken on a few sections within the Latour State Forest. This unit, in the sugar pine belt, is situated a few miles north and west of the Lassen Volcanic National Park. Although no logging has occurred on the forest, the timber stands are broken up by patches of dense brush as a result of severe fires that burned many years ago.

There is little brush cover under the timber stands, but where no trees occur the brush is exceedingly dense. There were only a few ribes bushes found per acre on the territory covered.

Klamath National Forest

Three sections were sampled by the reconnaissance crew in the Doggett Creek control unit to determine whether or not there was enough sugar pine present to justify its protection from white pine blister rust. This area supports mature timber. No data were collected on brush density or the number of ribes present.

WORK PERFORMED AND RESULTS OBTAINED

Blister-rust-control reconnaissance data were taken on 201,870 acres in two national forests of Oregon and in six national forests and one state forest in California. For Oregon there was an average of 200 trees in Group 1, 129 trees in Group 2, 75 trees in Group 3, and 9 trees in Group 4. The average for California was 278 trees for Group 1, 113 trees for Group 2, 82 trees for Group 3, and 17 trees for Group 4. Ribes information was not taken for all forests but for those having available data an average of 24 bushes per acre was found in Oregon and an average of 21 was found in California.

Table 1 presents the summarized data on the per acre basis for each control operation by states for the Pacific Coast Region. Within each control operation the data were segregated by the four yield expectancy groups and for each group the acres covered, the sugar pine trees per acre in each size class, and the number of ribes per acre are shown.

Table 2 shows the ownership of the acres covered in both Oregon and California. Of the 31,500 acres covered in Oregon 1,720 were O and C lands, 25,460 were Forest Service lands and 4,320 were in private ownership. Of the 170,370 acres worked in California 79,240 were under Forest Service jurisdiction, 2,620 belonged to the State of California, and 88,510 were privately owned.

TABLE 1

RIBES AND SUGAR PINE TREES BY SIZE CLASSES PER ACRE
 BY YIELD EXPECTANCY GROUP BY FOREST
 FOR OREGON AND CALIFORNIA - 1947

PART 1 - OREGON

Forest	Timber Type	Timber Group	Acres Sampled	Number of Sugar Pines Per Acre					Ribes Per Acre
				0-6'	6' - 3.5"	3.6" - 11.5"	+11.5"	Totals	
Rogue River	Mature	1	1,940	74	48	24	33	179	
		2	2,540	84	22	10	14	150	
		3	1,540	37	13	5	8	63	
		4	21,680	5	1	-	1	7	
		Totals	27,700	19	7	3	5	34	24.3
Siskiyou	Cut-over	1	680	114	64	16	12	206	
		2	500	62	33	13	14	121	
		3	400	77	28	4	-	109	
		4	1,300	16	4	1	-	21	
		Totals	2,800	57	27	7	3	94	-
	Mature	1	120	411	92	8	5	516	
		2	140	106	19	11	8	144	
		3	60	97	10	10	10	127	
		4	600	33	2	-	-	35	
		Totals	920	97	17	4	3	121	-
	Totals	1	800	158	68	15	11	253	
		2	640	77	33	13	4	127	
		3	460	80	25	5	1	111	
		4	1,900	21	3	1	-	25	
		Totals	3,800	67	25	6	3	101	-
Oregon Totals	Cut-over	1	680	114	64	16	12	206	
		2	500	62	33	13	14	121	
		3	400	77	28	4	-	109	
		4	1,300	16	4	1	-	21	
		Totals	2,880	57	27	7	3	94	-
	Mature	1	2,060	93	51	24	31	199	
		2	2,680	85	22	10	13	130	
		3	1,600	40	13	5	8	66	
		4	22,280	6	1	-	1	8	
		Totals	28,620	21	7	3	5	36	24.3
	Totals	1	2,740	98	54	22	26	200	
		2	3,180	82	24	11	12	129	
		3	2,000	47	16	5	7	75	
		4	23,580	6	1	1	1	9	
		Totals	31,500	24	9	4	4	41	24.3

TABLE 1 (Continued)

RIBES AND SUGAR PINE TREES BY SIZE CLASSES PER ACRE
BY YIELD EXPECTANCY GROUP BY FOREST
FOR OREGON AND CALIFORNIA - 1947

PART 2 - CALIFORNIA

Forest	Timber Type	Timber Group	Acres Sampled	Number of Sugar Pines Per Acre					Ribes Per Acre
				0-6'	6' - 3.5"	3.6" - 11.5"	+11.5"	Totals	
Latour State Forest	Mature	1	820	470	379	205	70	1,124	
		2	940	232	124	70	36	462	
		3	200	19	25	12	-	56	
		4	1,440	83	25	9	10	127	
		Totals	3,400	804	553	296	116	1,769	-
Lassen	Cut-over	1	3,670	144	31	19	12	206	
		2	2,380	68	19	7	4	98	
		3	930	60	14	7	-	81	
		4	10,170	10	2	1	-	13	
		Totals	17,150	49	11	6	3	69	19.9
	Mature	1	6,220	6,635	2,025	519	276	9,455	
		2	4,740	1,537	456	238	128	2,359	
		3	2,640	556	146	43	58	803	
		4	13,020	678	182	50	14	924	
		Totals	26,620	9,406	2,809	850	476	13,541	9.0
	Totals	1	9,890	9,394	2,622	882	500	13,398	
		2	7,120	2,397	699	327	177	3,600	
		3	3,570	836	214	77	58	1,185	
		4	23,190	1,215	296	89	14	1,614	
		Totals	43,770	13,842	3,831	1,375	749	19,797	14.0
Plumas	Cut-over	1	5,620	170	43	18	12	243	
		2	5,360	95	14	7	5	121	
		3	2,060	108	13	6	-	127	
		4	19,740	22	2	1	-	25	
		Totals	32,780	64	12	5	3	84	29.9
	Mature	1	1,820	253	39	21	19	332	
		2	3,560	99	13	7	13	132	
		3	2,380	72	11	5	5	93	
		4	15,020	18	1	1	1	21	
		Totals	22,780	55	7	4	5	71	20.5
	Totals	1	7,440	191	42	18	14	265	
		2	8,920	96	14	7	8	125	
		3	4,440	88	12	6	3	109	
		4	34,760	20	2	1	-	23	
		Totals	55,560	61	10	4	4	79	25.5

TABLE 1 (Continued)

RIBES AND SUGAR PINE TREES BY SIZE CLASSES PER ACRE
BY YIELD EXPECTANCY GROUP BY FOREST
FOR OREGON AND CALIFORNIA - 1947

PART 2 - CALIFORNIA (Continued)

Forest	Timber Type	Timber Group	Acres Sampled	Number of Sugar Pines Per Acre					Ribes Per Acre
				0-6'	6' - 3.5"	3.6"-11.5"	+11.5"	Totals	
Tahoe	Cut-over	1	860	163	33	4	10	210	
		2	120	138	24	3	-	165	
		3	80	78	8	7	-	93	
		4	920	10	2	2	-	14	
		Totals	1,980	87	17	3	4	111	-
	Mature	1	4,060	275	108	21	9	413	
		2	1,780	92	24	9	4	129	
		3	980	59	9	3	3	74	
		4	3,420	13	2	1	-	16	
		Totals	10,240	136	48	10	5	199	-
	Totals	1	4,920	256	95	18	9	378	
		2	1,900	95	24	9	3	131	
		3	1,060	60	9	4	3	76	
		4	4,340	13	2	1	-	16	
		Totals	12,220	127	44	9	5	185	-
Eldorado	Cut-over	1	940	91	29	18	12	150	
		2	520	83	18	6	2	109	
		3	260	69	24	9	-	89	
		4	3,700	10	1	1	-	12	
		Totals	5,420	34	9	5	2	50	-
	Mature	1	1,960	268	77	20	10	375	
		2	1,680	62	23	9	6	100	
		3	1,120	40	13	6	3	62	
		4	8,040	9	3	1	-	13	
		Totals	12,800	58	18	5	3	84	-
	Totals	1	2,900	208	61	19	11	299	
		2	2,200	67	22	8	5	102	
		3	1,380	42	14	7	3	66	
		4	11,740	9	3	1	-	13	
		Totals	18,220	51	15	5	3	74	-

TABLE 1 (Continued)

RIBES AND SUGAR PINE TREES BY SIZE CLASSES PER ACRE
BY YIELD EXPECTANCY GROUPS BY FOREST
FOR OREGON AND CALIFORNIA - 1947

PART 2 - CALIFORNIA (Continued)

Forest	Timber Type	Timber Group	Acres Sampled	Number of Sugar Pines Per Acre					Ribes Per Acre
				0-6'	6' - 3.5"	3.6" - 11.5"	+11.5"	Totals	
Stanislaus	Cut-over	1	7,540	154	51	24	9	238	
		2	2,920	94	22	10	1	127	
		3	1,640	62	9	6	-	78	
		4	12,020	12	2	1	-	15	
		Totals	24,120	69	21	10	3	103	-
	Mature	1	2,240	181	70	28	12	291	
		2	2,240	60	16	12	7	95	
		3	840	28	12	8	6	54	
		4	5,820	13	3	1	-	17	
		Totals	11,140	58	19	9	5	91	-
	Totals	1	9,780	160	56	26	10	252	
		2	5,160	79	20	11	4	114	
		3	2,480	50	10	7	2	69	
		4	17,840	13	2	1	-	16	
		Totals	35,260	66	20	10	3	99	-
Klamath	Mature	1	420	74	31	12	45	162	
		2	500	43	17	6	15	81	
		3	400	70	10	3	7	90	
		4	620	15	34	1	2	52	
		Totals	1,940	51	13	5	15	84	-
California Totals	Cut-over	1	18,630	154	43	20	11	228	
		2	11,300	89	18	7	3	117	
		3	4,970	81	13	7	-	101	
		4	46,550	15	2	1	-	18	
		Totals	81,450	61	14	7	3	85	26.2
	Mature	1	17,540	225	74	21	12	332	
		2	15,440	74	19	9	8	110	
		3	8,560	52	11	5	5	73	
		4	47,380	13	2	1	1	17	
		Totals	88,920	69	20	7	5	101	14.6
	Totals	1	36,170	188	58	21	11	278	
		2	26,740	80	18	9	6	113	
		3	13,530	62	12	5	3	82	
		4	93,930	14	2	1	-	17	
		Totals	170,370	65	17	7	4	93	20.6

TABLE 2

STATUS OF OWNERSHIP OF AREAS COVERED ON
BLISTER RUST CONTROL RECONNAISSANCE BY NATIONAL FOREST
FOR OREGON AND CALIFORNIA - 1947

Forest	Timber Type	O & C	Forest Service	Total Federal	State	Private	Totals
Oregon							
Rogue River	Cutover	-	-	-	-	-	-
	Mature	920	24,540	25,460	-	2,240	27,700
	Totals	920	24,540	25,460	-	2,240	27,700
Siskiyou	Cutover	440	640	1,080	-	1,800	2,880
	Mature	360	280	640	-	280	920
	Totals	800	920	1,720	-	2,080	3,800
Oregon Totals	Cutover	440	640	1,080	-	1,800	2,880
	Mature	1,280	24,820	26,100	-	2,520	28,620
	Totals	1,720	25,460	27,180	-	4,320	31,500
California							
Latour State Forest	Cutover	-	-	-	-	-	-
	Mature	-	-	-	1,980	1,420	3,400
	Total	-	-	-	1,980	1,420	3,400
Lassen	Cutover	-	3,650	3,650	-	13,500	17,150
	Mature	-	1,460	1,460	-	25,160	26,620
	Total	-	5,110	5,110	-	38,660	43,770
Plumas	Cutover	-	11,980	11,980	-	20,800	32,780
	Mature	-	17,630	17,630	-	5,150	22,780
	Totals	-	29,610	29,610	-	25,950	55,560
Tahoe	Cutover	-	1,980	1,980	-	-	1,980
	Mature	-	9,920	9,920	-	320	10,240
	Totals	-	11,900	11,900	-	320	12,220
Eldorado	Cutover	-	1,540	1,540	-	3,880	5,420
	Mature	-	8,760	8,760	-	4,040	12,800
	Totals	-	10,300	10,300	-	8,920	18,220
Stanislaus	Cutover	-	14,640	14,640	-	9,480	24,120
	Mature	-	6,840	6,840	640	3,660	11,140
	Totals	-	21,480	21,480	640	13,140	35,260
Klamath	Cutover	-	-	-	-	-	-
	Mature	-	840	840	-	1,100	1,940
	Totals	-	840	840	-	1,100	1,940
California Totals	Cutover	-	33,790	33,790	-	47,660	81,450
	Mature	-	45,450	45,450	2,620	40,850	88,920
	Totals	-	79,240	79,240	2,620	88,510	170,370
Pacific Coast Region							
Totals	Cutover	440	34,430	34,870	-	49,460	84,330
	Mature	1,280	70,270	71,550	2,620	43,370	117,540
	Totals	1,720	104,700	106,420	2,620	92,830	201,870

PART IX
DEVELOPMENT AND IMPROVEMENT OF CONTROL METHODS
IN THE PACIFIC COAST REGION

FOR 1947

By
H. R. Offord, Pathologist, C. R. Quick, Forest Ecologist, and
W. S. Burrill, Agent (Pathologist)

HIGHLIGHTS OF THE 1947 SEASON

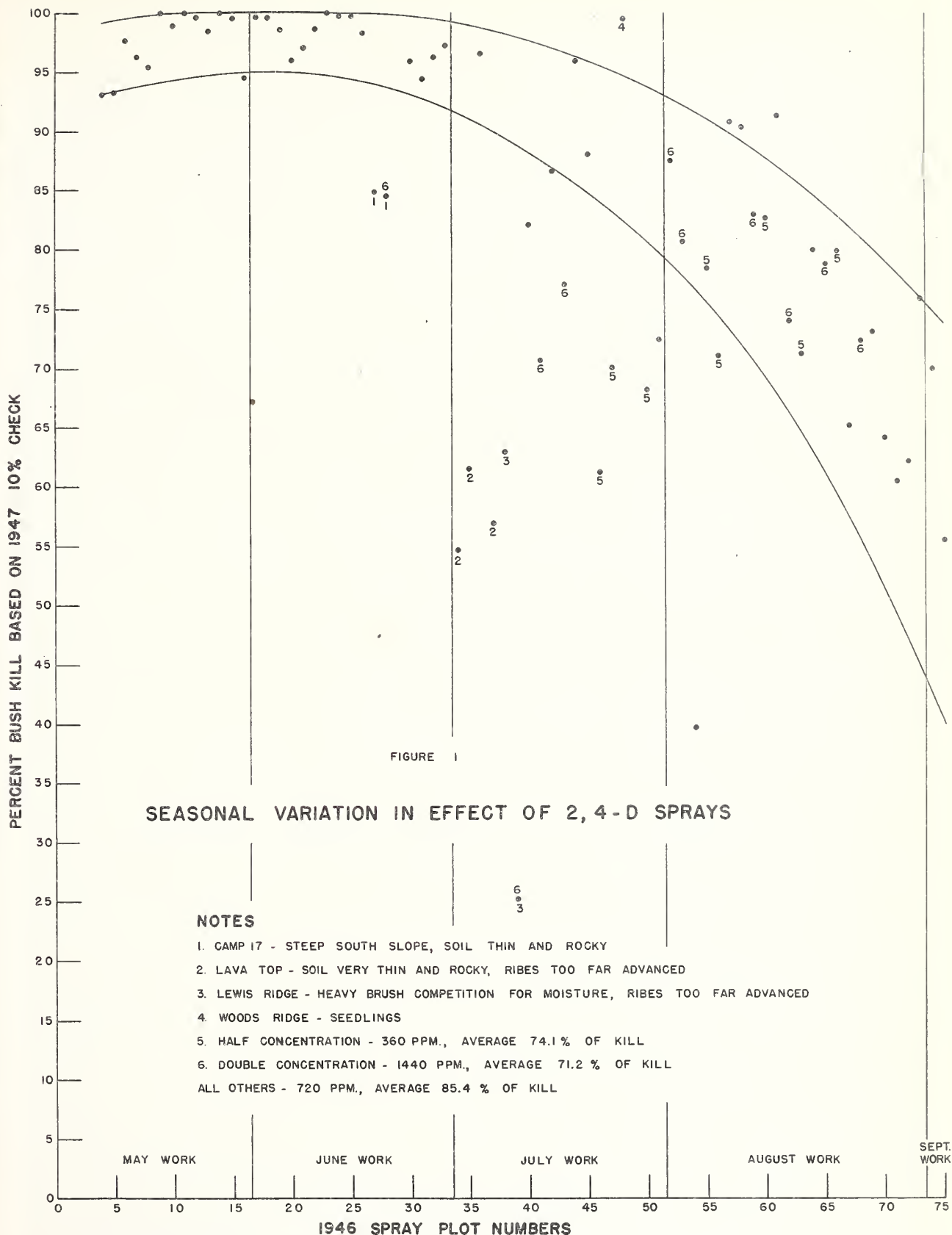
Work of the development and improvement project for the calendar year of 1947 in the Pacific Coast Region included office, laboratory, greenhouse, and field activities. This report is primarily a summary of accomplishments in field work. In offering the highlights on 1947 work of methods personnel, brief statements are given on the following three topics considered to be of greatest importance to the control program.

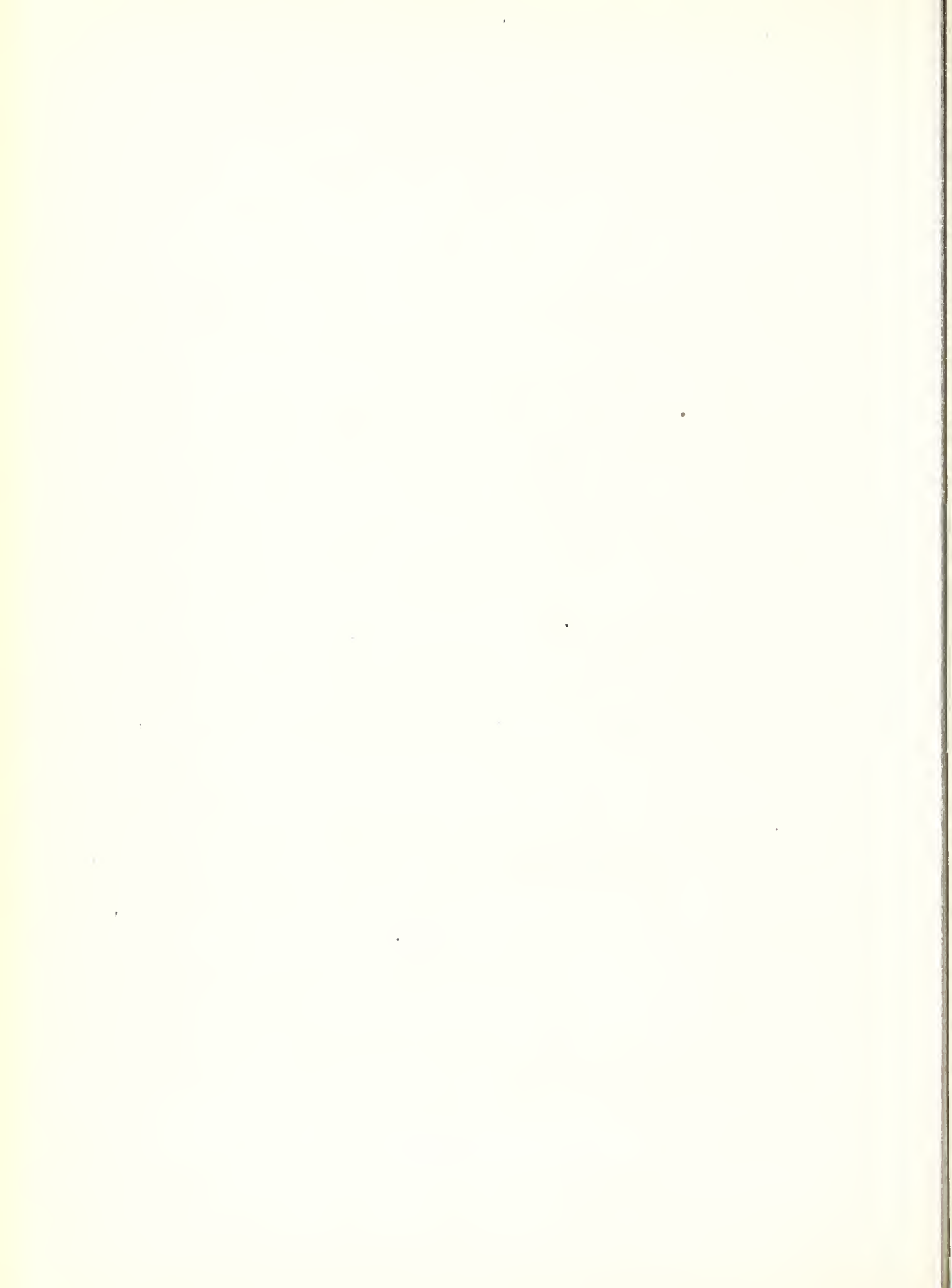
1. Results of previous work with 2,4-D.
2. Objectives of 1947 chemical work.
3. Cooperation with California Forest and Range Experiment Station on ecologic aspects of (a) the study of the economics of blister rust control and sugar pine management, and (b) the sugar pine logging and management plan for the Dodge Ridge tract, Stanislaus National Forest.

Results of Previous Work With 2,4-D

2,4-D was first tested on ribes at the Berkeley greenhouse in December 1944. In the Far West, from 1945 to 1947 inclusive, 1,018 field plots, varying in size from one milacre to several square rods and containing some 26,000 ribes plants, were established to test various 2,4-D products applied as: (1) dilute sprays (aqueous and oil) on intact plants, (2) dusts on intact plants, (3) oil and aqueous concentrates on decapitated crowns, and oil concentrates on the basal portions of intact or scarified stems. A high percentage bush kill was obtained on certain species of ribes with all of the methods tested. In addition to the controlled dosage plots just noted, 328 acres bearing heavy populations of R. roezli were worked in 1946 by an orchard-type power sprayer on an experimental basis. In this work 75 large plots (1/2 to 75 acres in size and containing some 272,000 ribes plants) were established on a semi-permanent basis. These plots were given 10% sampling check in 1947. Results of these large-scale plots are given in figure 1 and tables 5 and 6. During 1947 over 300 small-scale test plots were established; some 1,554 acres supporting heavy populations of R. roezli and R. nevadense were sprayed by power sprayers in practical operations work. In addition to this spray work, thousands of individual ribes were decapitated and the freshly scarified crown treated with liquid concentrates of 2,4-D.







Of the 15 Ribes species occurring in the Pacific Coast Region on which 2,4-D tests were made in the field, and on the basis of data so far available only five (R. bracteosum, R. cereum, R. nevadense, R. petiolare, and R. roezli) can be effectively and economically killed by dilute sprays applied to aerial plant parts. It should be emphasized that even the highly susceptible ribes can not be killed by dilute sprays unless all stems and leaves are thoroughly covered. Furthermore, a high percentage bush kill is attained only during a relatively short period of the year. For mature bushes of most Ribes species this period corresponds to the interval between the start of vegetative growth (leaves fully expanded) and the time that fruits are about 2/3ds size. Ease of killing plants of a susceptible species varies with age, growth rate, and vigor. Old, slow-growing plants are the hardest to kill and have a shorter period of susceptibility during any one growing season than young, fast-growing plants. Heavy germination of R. roezli seed has been noted the year following death of the parent bush by early season 2,4-D sprayers; only scattered seedlings were noted on areas sprayed in mid-season. In the selective spraying of ribes titanium dioxide, a brilliant white pigment (commercial grade known as Titanox B-30) is used as a marker at the rate of 1 to 1/2 pound per 100 gallons of 2,4-D spray solution. Sodium, ammonium, and amine salts, and the several commonly available esters of 2,4-D are about equally effective on ribes if comparisons are made on the acid equivalent basis. Most species of ribes can be killed by applying concentrates of 2,4-D (1 to 20%) directly to the freshly exposed crowns of decapitated plants.

Objectives of 1947 Chemical Work

Large scale methods tests of 1946 provided the basis for extensive use of 2,4-D sprays on R. roezli and R. nevadense during 1947. Also, 2,4-D was used on decapitated ribes for the first time in operations work in 1947. To define the scope and limitations of these two field methods more accurately, additional data were needed on species and varietal susceptibility (especially with respect to time of year) as well as further data on dosage and formulation of 2,4-D. Many of the ribes species of Oregon had proved to be resistant to 2,4-D and improved herbicides were needed for such species as R. lacustre, R. binominatum, and R. lobbii. New formulations of 2,4-D and of 2,4,5-trichlorophenoxyacetic acid were tested on resistant Oregon species. Similar formulations were tested to see if the effective spray season for fully mature upland ribes could not be extended beyond the present two months' period. A compact and portable knapsack sprayer (Hi-Fog-Gun) was used to apply small volumes of highly atomized 2,4-D concentrate in an effort to speed up the chemical work in thickets of brush and ribes and to permit effective chemical eradication of light and scattered ribes populations. Plots were established to test what has been termed the "basal stem treatment" of large upright ribes species such as R. nevadense and R. cereum. If successful, this method should reduce significantly the time needed to treat ribes that are now decapitated; savings of both time and chemical would be realized by basal stem treatment of large clumps of R. nevadense and R. cereum by comparison with present spray methods.

Recommendations for the use of chemicals in operations work are given in table 1A. These recommendations are subject to change by written memorandum to field supervisors after data are available from 1947 work.

TABLE 1A. RECOMMENDATIONS ON THE USE OF CHEMICALS FOR PRACTICAL RIBES ERADICATION WORK IN THE PACIFIC COAST REGION
(Summarizes best information available through the fall of 1947)

Common name of chemical	Grade or type to be purchased for field use	Ribes species	Dosage per milacre	
S p r a y s				
Ammate	du Pent's Ammate (contains 80% by weight of ammonium sulfamate plus inert materials)	<div>binominatum inermis (klamathense) lacustre (stream) lacustre (upland) lobbii montigenum tularense</div>	<div>Class 3</div>	<div>Pounds 2.0 2.0 1.0 1.5 2.0 1.5 1.0</div> <div>Dissolve 1 pound Ammate per gal. water. Wet leaves and stems and drench crown thoroughly.</div>
2,4-D	<div>Sodium salt (90% monohydrate) or Triethanolamine salt (60% or more aqueous solution) or Oil or water miscible ester (40% or more of ester)</div>	<div><div>bracteosum cereum nevadense roezli cruentum erythrocarpum sanguineum viscosissimum</div><div>Class 1 Class 2</div></div>		<div>1/2 to 3 gals., depending on size and age of bushes. Thorough coverage of all leaves and stems to ground line plus crown drench for large, multiple crown bushes, especially old bushes in class 2. Concentration 500 to 1000 ppm acid equivalent, depending on species and season. Use Titanox B-30 as a marker and Tergitol No. 7 as a spreader when equipment permits.</div>
D e c a p i t a t i o n				
2,4-D	<div>Triethanolamine salt (60% or more aqueous solution) Oil or water miscible ester (40% or more pure ester) (miscible only in kerosene or Diesel oil)</div>	<div>All ribes of class 1. All ribes of classes 2 and 3.</div>		<div>Use enough liquid to wet to the point of run-off all cut surfaces. Solution should contain not less than 5% of active 2,4-D ingredient for ribes of class 1, and not less than 20% active ingredient for ribes of classes 2 and 3. For classes 2 and 3, make cut at top of or through crown; for class 1 short stub ends of stems (not more than 3 inches long) may be treated.</div>

Effective September 1, Arthur London assumed the duties of supervisor and coordinator of the chemical methods of ribes suppression used in practical operations work. L. P. Winslow, formerly employed in this capacity, resigned from Government service to go farming.

Cooperation With California Forest and Range Experiment Station

Two important projects initiated by the Forest Service in Region 5 have called for active participation by methods personnel, primarily in furnishing ecologic data on problems of ribes suppression. One of these projects has been the economic analysis of sugar pine management and blister rust control being made by H. Vaux of the California Forest and Range Experiment Station; the other, the preparation of a cutting schedule and management plan favoring sugar pine in a tract of mixed conifer on Dodge Ridge, Stanislaus N.F. The latter project under the technical supervision of Duncan Dunning has entailed both field and office work by C. R. Quick. Ribes seed have been extracted from duff and soil samples collected in the fall of 1947 to help determine potentials of ribes regeneration in advance of proposed 1948 cutting schedules.

SECTION I. THE DEVELOPMENT OF NEW HERBICIDES
FOR RIBES ERADICATION

RESULTS OF 1946 FIELD WORK

2,4-D Tests (Controlled Dosage Plots)

Tables 1 and 2 give results of the 1946 controlled dosage plots arranged to show percent bush kill in relation to the concentration of 2,4-D (table 1) and the type of 2,4-D product (table 2). These two categories are subdivided to show the effect of gallonage of spray used (dosage), date of application, location, and soil type. The most striking and consistent result is the decline in bush kill with advancement of the season, i.e., decrease in growth vigor of the ribes. A second consistent and highly significant result was the interaction of age of bushes (not shown directly by the date in tables 1 and 2) on the seasonal bush kill. Young age class ribes (4 yrs. or less) can be effectively killed throughout July and the early part of August during the average growing season in the Sierra Nevada. Fully mature and old bushes tend to sprout from the crown if sprayed later than the end of June. This point is illustrated by data in table 7 comparing results of sprays applied at the same time and place by the large power sprayer and by the portable sprayer used for small plot tests. Small plots were chosen so as to provide as many uniformly large bushes as possible on the half-square-rod plot. Areas sprayed by the large power sprayer usually had a normal distribution of ribes of varying size and age. As a result, bush kill for mid-season and late season spraying was invariably greater on the large plots than on the controlled dosage plots. The two types of plots show about the same bush kill for the early season tests.

TABLE 1

ANALYSIS OF RESULTS OF 1946 CONTROLLED DOSAGE TESTS BY CONCENTRATIONS OF 2,4-D
(R. roezli only)

Forest	Date Treated	2,4-D	Percent Bush Kill					Other Concentrations	
			Concentrations in ppm						
			90	180	360	720	1440		
(A) By Date and Chemical									
Sierra	5/9	Na							65, 84, 90, 96 (60, 120, 240, 480 ppm)
do.	do.	BE							27, 87, 93, 85 (60, 120, 240, 480 ppm)
Plumas	5/21, 24	Na	32	51	75	80			
do.	do.	BE	78	84	86	95			
Stanislaus	6/3, 4	Na	97	100	100	100			
do.	do.	NH ₄	98	98	99	100			
do.	do.	BE	100	100	98	98			
Plumas	6/24-27	Na	58	60	100				
do.	do.	NH ₄	84	71	90	97			
do.	do.	BE	95	98	88	90			
Plumas*	7/15	NH ₄		7	5	3			
do. *	do.	BE		0	0	0	0		
Stanislaus	7/23, 24	Na	57	62	67	50	47		
do.	do.	BE	73	54	37	29	53		
do.	7/30-8/2	NH ₄	68	79	41	54	76		
do.	do.	BE							67 (conc. 3.2%), 80 (conc. 3.2% + S.Oil)
do.	do.	Tri.	71	60	71	49	69		77 (conc. 2%)
do.	do.	Acid							28 (188 ppm)
do.	8/5-9	Na							74 (557 ppm + chlorate)
do.	do.	NH ₄	24	27	35	63	19		
do.	do.	BE							57 (conc. 3.2% + S.Oil)
do.	do.	Tri.	16	24	30	31	13		
Lassen	8/13	NH ₄	41	50	70	43	50		
Plumas	8/22	Na				40	40		
do.	do.	NH ₄		43	75	63	79		
do.	do.	BE							40 (conc. 3.2%)
Stanislaus	9/3	NH ₄	40	50	42	58	50		
do.	9/17	NH ₄	41	38	30	26	41		
(B) By chemical, All Areas and All Dates									
All	All	Na	62	69	83	70	44	80 (dilute)	
		NH ₄	58	71	56	63	48		
		BE	86	67	68	69	35	73 (dilute), 66 (conc.)	
		Tri.	38	38	47	38	35	77 (conc.)	
		Acid						28 (dilute)	
All	All	All	63	57	64	62	42	64 (dilute), 69 (conc.)	
(C) By Chemical, Area and Soil Type									
Northern (Plumas N.F. - Rock Creek Ridge - Lava-granitic Soil Type)									
Plumas		Na	41	54	83	60	40		
do.		NH ₄	84	62	85	85	79		
do.		BE	87	91	87	92		40 (conc. 3.2%)	
Average			71	71	85	83	60	40 do.	
Southern (Stanislaus N.F., Camp 41 and Jawbone Creek - Meta-granitic Soil Type)									
Stanislaus		Na	84	81	83	75	47	74 (dilute)	
do.		NH ₄	54	58	51	64	43		
do.		BE	86	77	67	63	53	68 (conc.)	
do.		Tri.	38	38	47	38	35	77 (conc.)	
Average			60	61	59	61	42	70 (conc.)	

*Lewis Ridge.



TABLE 2

ANALYSIS OF RESULTS OF 1946 CONTROLLED DOSAGE TESTS BY TYPES OF
2,4-D PRODUCT USED (R. roezli only)

Location (National Forest and Area)	Date Treated	Method of Treatment	Percent Bush Kill By Type of 2,4-D					Average Per- cent Bush Kill
			Na	NH ₄	Butyl Ester	Tri- eth.	Acid	
(A) Treatment and Dosage								
Sierra, Peterson Mill	5/9	Spray 10 gal./sq. rod	84		73			78
Stanislaus, Camp 41	6/3	do.	100	100	100			100
do. do.	7/23,24	do.	56		49			52
do. do.	7/30, 8/1	do.		63	80	64	28	61
do. do.	8/5-9	do.		27		23		25
do. Jawbone Cr.	8/9	do.		100				100
do. Camp 41	9/3	do.		48				48
do. do.	9/17	do.		35				35
Plumas, Rock Creek	5/21-23	do.	52		87			66
do. do.	6/26	do.	73	88	95			86
do. Lewis Ridge	7/15	do.		3	0			1
do. Rock Creek	8/22	do.		65				65
Lassen, Wilson Lake	8/13	do.		51				51
Average			68	51	68	39	28	55
Stanislaus, Camp 41	6/4	Spray 5 gal./sq. rod	99	98	98			98
Plumas, Rock Creek	5/24	do.			84			84
do. do.	6/24-27	do.		83	90			87
Average			99	90	90			92
Stanislaus, Jawbone Cr.	8/8,9	Spray and drench	74	82				78
Plumas, Lewis Ridge	7/15	do.		13	0			4
do. do.	5/21	do.	80					80
do. do.	8/22	do.	40					40
do. do.	do.	Conc. light			40			40
Stanislaus, Jawbone Cr.	8/2	Conc. mist			67	77		72
do. do.	8/7	Conc. mist			57			57
Average			64	65	49	77		59
(B) By Date								
Sierra, Peterson Mill	5/9	All	84		73			78
Plumas, Rock Creek	5/21-24	do.	56		86			72
Stanislaus, Camp 41	6/3,4	do.	99	99	99			99
Plumas, Rock Creek	6/24-27	do.	73	85	92			86
Plumas, Lewis Ridge	7/15	do.		5	0			2
Stanislaus, Camp 41	7/23,24	do.	56		49			52
Stanislaus, Camp 41, Jawbone Cr.	7/30-8/2	do.		63	74	68	28	63
do. do. do.	8/5-9	do.	74	40	57	23		38
Lassen, Wilson Lake	8/13	do.		51				51
Plumas, Rock Creek	8/22	do.	40	65	40			54
Stanislaus, Camp 41	9/3	do.		48				48
do. do.	9/17	do.		35				35
Average			71	56	69	44	28	60
(C) By Area and Soil Type								
Northern (Plumas N.F., Rock Creek Ridge - Lava-granitic Soil Type)								
Plumas, Rock Creek	5/21-24	All	56		86			72
do. do.	6/24-27	do.	73	85	92			86
do. do.	8/22	do.	40	65	40			54
do. do.		do.	58	79	86			76
Average			58	79	86			76
Southern (Stanislaus N.F., Camp 41 and Jawbone Cr.-Meta-granitic Soil Type)								
Stanislaus, Camp 41	6/3,4	All	99	99	99			99
do. do.	7/23,24	do.	56		49			52
do. do. Jawbone Cr.	7/30,8/2	do.		63	74	68	28	63
do. do.	8/5-9	do.	74	40	57	23		38
do. do.	9/3	do.		48				48
do. do.	9/17	do.		35				35
Average			76	63	70	44	28	58



Major attention of the 1946 plot work was centered on R. roezli. Nevertheless, sufficient data were obtained on R. nevadense and R. cereum to show that both of these species can be effectively killed by dilute aqueous 2,4-D sprays applied to aerial plant parts. Of the species commonly found within control areas of southern Oregon R. bracteosum is the only one that can be called highly susceptible. Results of 1946 tests on R. cruentum and R. sanguineum were not satisfactory but it is believed that failure to obtain a high percentage bush kill can be attributed to late season application. Indications are that R. sanguineum, R. cruentum, R. erythrocarpum, and R. viscosissimum (certainly young vigorous populations of these species) can be effectively killed by 2,4-D sprays. Only a few decapitation tests were made on field plants during 1946 but results were uniformly good for all ribes species when the bush had been cut off close to the crown. Ribes that are hard to kill by 2,4-D sprays are resistant to a degree to the decapitation treatment. As yet the full implication of seasonal effect in relation to decapitation treatment has not been established. Results of 1947 tests should clarify this matter.

Details of the results of individual plots are given in table 3 (California), and table 4 (Oregon).

Diesel Oil Tests

Attention is again called to the seedling occurrence data (table 4A) for the Chowchilla Mt. oil plots. The destruction of ribes seed in the soil incidental to the chemical eradication of the parent ribes is clearly illustrated by data for the past 9 years on these sprayed plots. It would appear to be practical to absorb a high cost for initial ribes eradication if the number of subsequent workings can be reduced.

TABLE 3
RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill		
						Live stem	Bushes	
I. Uniform dosage 1/2 sq. rod plots at 10 gal./sq. rod rate								
Ribes roezli								
101	Sierra NF Peterson Mill	5/9	Spray	Na - 480	Tergitol	99	96	
102				do. 240		99	90	
103				do. 120		96	84	
104				do. 60		97	65	
105				BE - 480		98	85	
106				do. 240		99	93	
107				do. 120		94	87	
108				do. 60		38	27	
124	Stanislaus NF Camp 41	6/3	Spray	NH ₄ - 720	Tergitol	100	100	
125				do. 360		100	100	
126				do. 180		100	100	
127				do. 90		100	100	
128				BE - 720		100	100	
129				do. 360		100	100	
130				do. 180		100	100	
131				do. 90		100	100	
132				Na - 720		100	100	
133				do. 360		100	100	
134				do. 180		100	100	
135				do. 90		100	100	
176		7/23		do. 1440		100	69	
177				do. 720		100	80	
178				do. 360		100	50	
179				do. 180		100	50	
180				do. 1440		100	24	
181				do. 720		100	20	
182				do. 360		100	83	
183				do. 180		100	74	
184				do. 90		100	57	
185				BE - 1440		100	36	
186		7/24		do. 720		100	25	
187				do. 360		100	33	
188				do. 180		100	41	
189				do. 90		100	56	
190				do. 1440		100	70	
191				do. 720		100	33	
192				do. 360		100	40	
193				do. 180		100	67	
194				do. 90		100	89	

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill	
						Live stem	Bushes
I. Uniform dosage 1/2 sq. rod plots at 10 gal./sq. rod rate (contd)							
Ribes roezli							
195	Stanislaus NF Camp 41	7/30	Spray	Acid 188%	Tergitol	86	23
196				do.	do.	85	30
197				do.	B-30	79	28
198				do.	Tergitol B-30	89	31
199				BE 8240	S Oil 1.32%	99	94
200				do. 4120	do.	98	77
201				do. 2060	do.	97	72
202				do. 1030	do.	93	78
203				NH ₄ 1440	do.	100	81
204				do. 720	do.	100	71
205		do. 360		do.	100	53	
206		do. 180		do.	100	76	
207		do. 90		do.	100	68	
208		do. 1440		Tergitol	100	70	
209		do. 720		do.	100	37	
210		do. 360		do.	95	28	
211		do. 180		do.	100	82	
212		do. 90		do.	100	67	
217		Trieth. 1440		do.	100	80	
218		do. 720		do.	100	33	
219		do. 360		do.	100	67	
220		do. 180		do.	100	69	
221		do. 90		do.	100	75	
222		do. 1440		do.	100	58	
223		do. 720		do.	100	65	
224		do. 360		do.	100	75	
225		do. 180		do.	100	50	
226		do. 90		do.	100	67	
239		NH ₄ 1440		Terg., B-30	100	22	
240		do. 720		do. do.	100	44	
241		do. 360		do. do.	100	38	
242		do. 180		do. do.	100	26	
243		do. 90		do. do.	100	50	
244		do. 1440		Terg., AWD	100	7	
245		do. 720		do. do.	100	16	
246		do. 360		do. do.	98	32	
247		do. 180		do. do.	100	13	
248		do. 90		do. do.	95	0	
249		do. 1440		Terg., RC	100	29	
250		do. 720		do. do.	100	36	
251		do. 360		do. do.	100	35	
252		do. 180		do. do.	100	42	

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill	
						Live stem	Bushes
I. Uniform dosage 1/2 sq. rod plots at 10 gal./sq. rod rate (contd.)							
Ribes roezli							
152	Plumas NF	6/26	Spray	BE 720	Tergitol	100	100
153	Rock Cr. Ridge			do. 360	do.	95	90
154	do.			do. 180	do.	100	100
155	do.			do. 90	do.	88	90
156	do.			Na 360	do.	100	100
157	do.			do. 180	do.	78	60
158	do.			do. 90	do.	50	58
159	do.			NH ₄ 720	do.	99	93
160	do.			do. 360	do.	100	100
161	do.			do. 180	do.	50	67
162	do.	7/15	Spray	do. 90	do.	80	90
167	Lewis Ridge			do. 1440	do.	50	03
168	do.			do. 720	do.	25	05
169	do.			do. 360	do.	0	0
171	do.			BE 1440	do.	0	0
172	do.			do. 720	do.	0	0
173	do.			do. 360	do.	0	0
320	Rock Cr. Ridge			NH ₄ 1440	Terg., B. Naph.	88	79
321	do.			do. 720	do. do.	89	63
322	do.			do. 360	do. do.	98	75
323	do.	do. 180	do. do.	26	43		
279	Lassen NF	8/13	Spray	NH ₄ 1440	Tergitol	98	50
280	Wilson Lake			do. 720	do.	100	44
281	do.			do. 360	do.	98	70
282	do.			do. 180	do.	98	50
283	do.			do. 90	do.	100	41
Ribes nevadense							
124	Stanislaus NF	6/3	Spray	NH ₄ 720	Tergitol	100	100
129	Camp 41			BE 360	do.	100	100
131	do.			do. 90	do.	100	100
132	do.			Na 720	do.	100	100
133	do.			do. 360	do.	100	100
135	do.			do. 90	do.	100	100
270	Jawbone Cr.	8/8		NH ₄ 720	Ammate .15%	100	100
Ribes cereum							
280	Lassen NF Wilson Lake	8/13	Spray	NH ₄ 720	Tergitol	95	0

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill	
						Live stems	Bushes
I. Uniform dosage 1/2 sq. rod plots at 10 gal./sq. rod rate (contd.)							
Ribes roezli							
253	Stanislaus NF Camp 41	8/6	Spray	NH ₄ 90	Tergitol RC	95	21
254		do.		Trieth. 1440	do. B-30	100	0
255		do.		do. 720	do. do.	100	6
256		do.		do. 360	do. do.	100	29
257		do.		do. 180	do. do.	100	27
258		do.		do. 90	do. do.	95	12
259		8/8		do. 1440	Tergitol, AWD	100	18
260		do.		do. 720	do. do.	100	50
261		do.		do. 360	do. do.	100	29
262		do.		do. 180	do. do.	100	17
263		do.		do. 90	do. do.	90	22
264		do.		do. 1440	Terg., RC	95	21
265		do.		do. 720	do. do.	100	36
266		do.		do. 360	do. do.	100	33
267		do.		do. 180	do. do.	100	27
268		do.		do. 90	do. do.	100	13
270	Stanislaus NF	do.	Spray	NH ₄ 720	Ammate .15%	100	100
277	Jawbone Cr.	8/9		None	S Oil 2.64%	33	0
278		do.		do.	do. 1.32%	33	0
324	Stanislaus NF Camp 41	9/3		NH ₄ 1440	Tergitol	100	50
325		do.		do. 720	do.	95	58
326		do.		do. 360	do.	100	42
327		do.		do. 180	do.	100	50
328		do.		do. 90	do.	100	40
329		9/17		do. 1440	do.	90	41
330		do.		do. 720	do.	90	26
331		do.		do. 360	do.	90	30
332		do.		do. 180	do.	95	38
333		do.		do. 90	do.	95	41
110	Plumas NF	5/21	Spray	Na 360	Terg. Vel. Wh.	60	84
111	Rock Cr. Ridge	do.		do. 180	do. do.	30	46
112		do.		do. 90	do. do.	20	46
113		5/22		BE 720	do.	100	100
114		do.		do. 360	do.	86	92
115		do.		do. 180	do.	98	90
116		do.		do. 90	do.	73	67
117		5/23		Na 360	Terg. Des. Wh.	73	65
118		do.		do. 180	do. do.	77	55
119		do.		do. 90	do. do.	58	13

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill			
						Live stems	Bushes		
II. Uniform dosage 1 sq. rod plots of 5 gal./sq. rod rate									
Ribes roezli									
136	Stanislaus NF Camp 41	6/4	Spray	NH ₄ 720	Tergitol	100	100		
137				do. 360	do.	99	98		
138				do. 180	do.	100	96		
139				do. 90	do.	99	96		
140				BE 720	do.	100	95		
141				do. 360	do.	100	95		
142				do. 180	do.	100	100		
143				do. 90	do.	100	100		
144				Na 720	do.	100	100		
145				do. 360	do.	100	100		
146	do. 180	do.	100	100					
147	do. 90	do.	99	94					
120	Plumas NF Rock Cr. Ridge	5/24	Spray	BE 720	Tergitol B-30	80	90		
121				do. 360	do. do.	84	80		
122				do. 180	do. do.	76	77		
123				do. 90	do. do.	81	89		
148				do. 720	do.	80	79		
149		do. 360		do.	60	85			
150		do. 180		do.	67	95			
151		do. 90		do.	100	100			
163		6/24		NH ₄ 720	do.	100	100		
164				do. 360	do.	99	80		
165				do. 180	do.	63	75		
166				do. 90	do.	80	73		
Ribes nevadense									
136		Stanislaus NF Camp 41		6/4	Spray	NH ₄ 720	Tergitol	100	100
137						do. 360	do.	100	100
139	do. 90		do.			83	20		
143	BE 90		do.			100	100		
144	Na 720		do.			100	100		
146	do. 180		do.			100	100		
147	do. 90		do.			100	100		

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of 2,4-D and ppm (AE)	Other chemicals added	Percent kill	
						stem	Bush- es
III. Individual bush and irregular shape, dilute spray plots at approx. 10 gal./sq. rod							
Ribes roezli							
269	Stanislaus NF Jawbone Creek	8/8	Spray & drench	NH ₄ 720	Ammate .3%	98	88
271		do.		do. 720	do. .075%	100	100
272		do.		do. 720	do. .0375%	98	57
273		8/9		Na 557	Chlorate .3%	93	80
275		do.		do. 557	do. .075%	99	50
276		do.		do. 557	do. .0375%	99	93
170	Plumas NF	7/15	do.	NH ₄ 180	Tergitol	90	13
174	Lewis Ridge	do.		BE 180	do.	0	0
175	do.	do.		do. 1440	do.	0	0
109	Rock Cr. Ridge	5/21	Spray	Na 720	Terg., Vel. Wh.	*90	80
317	do.	8/22		do. 1440	Tergitol	*50	40
318	do.	do.		do. 720	do.	*50	40
319	do.	do.		BE 32000	do.	*50	40
Ribes nevadense							
269	Stanislaus NF Jawbone Creek	8/8	Spray and drench	NH ₄ 720	Ammate .3%	100	100
271		do.		do. 720	do. .075%	100	100
272		do.		do. 720	do. .0375%	100	100
273		8/9		Na 557	Chlorate .3%	100	100
274		do.		do. 557	do. .15%	91	80
275		do.		do. 557	do. .075%	73	0
276		do.		do. 557	do. .0375%	100	100
Ribes cereum							
284	Lassen NF Feather R. Mdws.	8/13	Spray	BE 1440	Tergitol	98	0
285				do. 720	do.	98	0
286				NH ₄ 1440	do.	98	0
287				do. 720	do.	98	0

*Estimates only.

TABLE 3 (continued)

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 3 RIBES SPECIES
IN CALIFORNIA

Plot No.	Plot location	Date	Method of treatment	Type of	Other chemicals added	Percent kill	
				1/ 2,4-D compound and percent conc.		Live stem	Bush- es
IV. Individual bush and irregular shaped dust plots							
Ribes roezli							
213	Stanislaus NF Camp 41	7/31	Dust	10%	Pyrax (filler)	*75	20
214				10%		*75	20
215				5%		*50	10
216				5%		*40	10
Ribes nevadense							
216	do.	7/31	do.	5%	do.	*40	10
V. Individual bushes, concentrate sprays, and pin point coverage							
Ribes roezli							
227	Stanislaus NF Jawbone Creek	8/2	Light mist	Trieth. 2.06%	None		67
228				do.	Tergitol		98
229				do.	B-30		75
230				do.	Tergitol B-30		67
231				BE 3.2%	None		63
232				do.	Tergitol		73
233				do.	S & W		53
234		8/7		do.	Tergitol S & W		80
235				do.	S Oil		64
236				do.	S Oil, Terg.		67
237				do.	S Oil, S & W		44
238				do.	S Oil, Terg. S & W		54
Ribes nevadense							
227	Stanislaus NF Jawbone Creek	8/2	Light mist	Trieth. 2.06%	None	100	100
228				do.	Tergitol	100	100
229				do.	B-30	100	100
230				do.	Tergitol B-30	100	100
231				BE 3.2%	None		77
232				do.	Tergitol	100	100
233				do.	S & W		93
234		8/7		do.	Tergitol S & W		85
235				do.	S Oil		88
236				do.	S Oil, Terg.		86
238				do.	S Oil, Terg., S & W	100	100

1/ Applied as a mist the "light" signifies pin point coverage.

*Estimates only.

TABLE 4

RESULTS OF 1946 CONTROLLED DOSAGE TESTS OF 2,4-D ON 7 OREGON RIBES

Plot No.	Plot location	Date	Method of treatment	1/ Type of 2,4-D ppm(AE) or percent	Other chemicals added	Percent kill	
						Live stems	Bushes
I. Uniform dosage 1/4 sq. rod plots at 10 gal./sq. rod rate							
Ribes bracteosum							
297	Rogue River NF River Bank	8/19	Spray	NH ₄ 1440	Tergitol	100	100
298		do.	do.	do. 720	do.	100	100
299		do.	do.	do. 360	do.	100	100
300		do.	do.	do. 180	do.	100	100
Ribes lacustre							
297	Rogue River NF	8/19	Spray	NH ₄ 1440	Tergitol	0	0
299	River Bank	do.	do.	do. 360	do.	0	0
300	do.	do.	do.	do. 180	do.	0	0
308	Ginko Creek	8/20	do.	do. 180	do.	0	0
II. Uniform dosage 1/2 sq. rod plots of 10 gal./sq. rod rate							
Ribes sanguineum							
305	Rogue River NF Ginko Creek	8/20	Spray	NH ₄ 1440	Tergitol	90	38
306			do.	do. 720	do.	90	15
307			do.	do. 360	do.	90	53
308			do.	do. 180	do.	75	64
III. Individual bush and irregular shape, dilute spray plots at approximately 10 gal./sq. rod rate							
Ribes lobbii							
312	Rogue River NF	8/20	Spray &	Na 180	Terg., B. Naph.	0	0
315	Huckleberry Mt		drench	Trieth. 360	Tergitol	0	0
Ribes sanguineum							
309	Rogue River NF Huckleberry Mt	8/30	Spray & drench	Na 1440	Terg., B. Naph.		0
311				do. 360	do. do.		0
312				do. 180	do. do.		5
313				Trieth. 1440	do.		50
314				do. 720	do.		25
315				do. 360	do.		33
316				do. 180	do.	0	0
IV. Individual bushes, concentrate sprays, and pin point coverage							
Ribes binominatum							
301	Rogue River NF	8/19	Heavy	BE 3.2%	None	98	94
302	Hershburger LO		Light	BE 3.2%	do.	50	20
Ribes erythrocarpum							
301	Rogue River NF Hershburger LO	8/19	Heavy	BE 3.2%	None	100	100
Ribes viscosissimum							
303	Rogue River NF	8/19	Heavy	BE 3.2%	None	99	89
304	Rabbit Ears		Light	BE 3.2%	do.	95	50
Ribes lacustre							
292	Klamath NF	8/15	Light	Trieth. 2.06%	do.	5	0
293	Long John		Heavy	do. do.	do.	50	0

^{1/} Applied as a mist the "light" signifies pin point coverage. "Heavy" signifies enough solution to moisten leaves uniformly.

TABLE 4A

RESULTS OF 1938 DOSAGE TESTS OF OIL MIXTURES ON SMALL R. ROEZLI BUSHES,
CHOWCHILLA MT., SIERRA N.F., CALIFORNIA - SUMMARY OF DATA 1938-47

Plot No.	Dosage in gals. per milacre	Oil mixture used	1938		No. current sea- son seedlings removed from plots 1939-47			Total fruit- ing bushes removed 1939-47	Non-fruit- ing bu. left (over 1 yr. old) 1947 check
			Number bushes on plot	Percent bushes killed	1939-47		Total 1939-47		
					1939	1947			
28	0.5	SO ₂ Extract	195	90	15	-	52	12	2
1	1.0		43	93	-	-	-	2	-
2	1.5		105	96	2	-	6	4	-
3	2.0		55	100	-	-	-	-	1
4	3.0		70	100	-	-	-	-	-
5	5.0		137	99	-	-	-	1	-
6	10.0		94	100	-	-	-	-	-
7	1.0	Diesel Oil	18	83	1	-	2	3	-
8	1.5		35	96	8	-	10	1	-
9	2.0		76	93	4	-	9	3	1
10	3.0		56	100	-	-	-	2	-
11	5.0		59	100	-	-	-	-	-
12	10.0		35	100	-	-	-	-	-
13	1.0	Diesel Oil + Crude Oil	58	71	54	-	113	10	6
14	1.5		94	91	17	-	30	9	-
15	2.0		21	81	9	-	25	4	-
16	3.0		109	100	1	-	1	1	-
17	5.0		110	95	1	-	9	6	-
18	10.0		65	100	-	-	-	-	-
29	0.5	SO ₂ Extract + Diesel Oil	57	100	24	-	66	-	-
19	1.0		77	92	93	-	147	9	3
20	1.5		210	94	22	-	37	14	-
21	2.0		23	96	7	-	45	-	-
22	3.0		46	100	3	-	9	1	-
23	5.0		127	100	-	-	5	-	-
24	10.0		135	100	-	-	-	-	-
25	0	Control	209	0	87	-	155	75	60
26	0		25	0	137	-	240	27	-
27	0		170	0	81	5	151	90	30

*See 1946 annual report for detailed data on number of seedlings removed annually for 1944 to 1946 inclusive.

2,4-D Tests (Plots by Power Sprayer)

The 75 plots established by power sprayer from May through September 1946 were checked in mid-season 1947 by a 10% continuous strip. In tables 5 and 6, data obtained from this check are summarized to show percent bush kill for classifications of: type of 2,4-D product, concentration, area worked, and type of marker and spreader used. In addition to the 323.8 acres of plots described in table 5, there were 4.2 acres (Jawbone, Stanislaus N.F.) in several late season tests of 2,4-D concentrates. On the total 328 acres of large-scale plots there were 264,649 Ribes roezli, and 6,703 R. nevadense. As shown in table 6, results on these R. nevadense and on a few scattered R. cereum were exceptionally good.

During July, August, and September bush kill obtained on these large-scale plots was generally higher than on the controlled dosage plots, as noted in par. 1, section 1, of this report. Plot data for the large and small tests considered to be closely comparable are given in table 7. Comparison with data in tables 1 and 2 (no markers were used on the small plots) show that the four markers used in large-scale tests (Titanox B-30, Desert White, Velvet White, and sulphur) did not reduce the toxicity of 2,4-D to R. roezli. Sprays with and without the spreader Tergitol #7 resulted in about the same bush kill. Since most of the proprietary 2,4-D herbicides are now formulated with a conditioner or detergent, the addition of Tergitol will be necessary only when a combination of weather, hard water, and characteristics of ribes foliage result in poor wetting of foliage. The spray foreman can tell by ocular inspection when additional spreader is needed. Reference to figure 1 and to tables 5 and 6 further confirm the extreme importance of spraying ribes with 2,4-D during the early part of the growing season. The seasonal effect is so great that it masks possible small variations in bush kill caused by the type of 2,4-D product (sodium, ammonium, or triethanolamine salt or ester) or by the concentration of 2,4-D acid in the formulation. Supplies of triethanolamine were not obtained until mid-season. As a result, comparisons cannot be made with other 2,4-D products except for mid-season and late-season work. Conclusions of interest to operations work from data shown by figure 1 and by tables 5, 6, and 7 are that unskilled workers can be used to spray ribes by power methods with good prospects for a 95% or better kill of R. roezli, R. nevadense, and R. cereum provided the spray work is done at the proper time during the growing season. As clearly shown by notes and legend of table 1, the site, age class, and ecologic associates of ribes must be given proper consideration in scheduling the time of year for spraying.

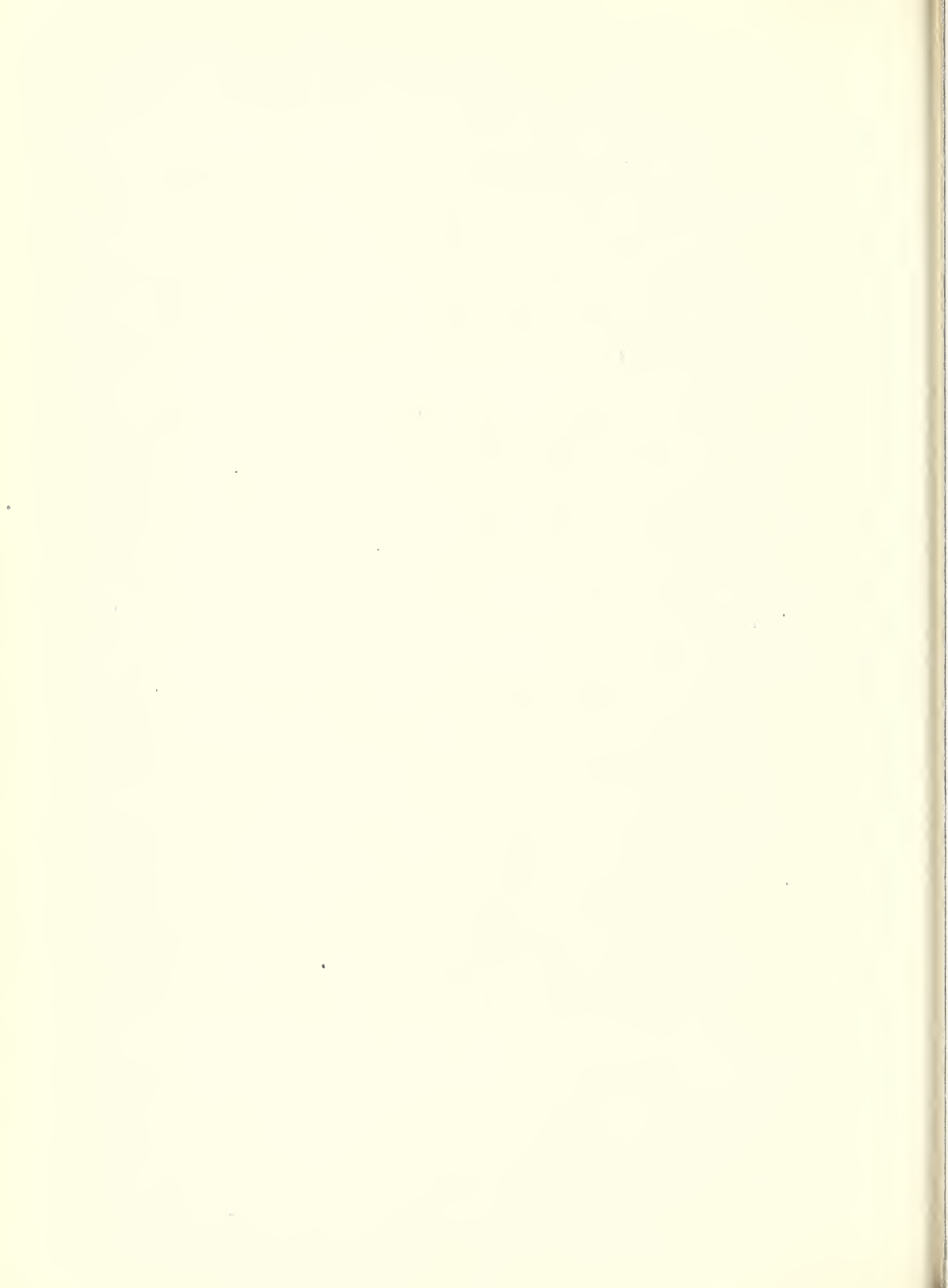


TABLE 5

RESULTS OF 2,4-D PRACTICAL TESTS FROM ANALYSIS AS GIVEN ON 1946 TALLY SHEET
(Based on a 10 Percent Check, 1947)

2,4-D	Forest	Marker	Spreader	Date	Concentration of 2,4-D, Plot No., and Percent Bush Kill				
					360 ppm	720 ppm	1,440 ppm	Total	Percent Kill
Sodium	Plumas	Titanox B-30	Tergitol #7	5/16-20		1-3		3	*
		Velvet White		5/20-21		4		1	93.2
		Desert White		5/23		7		1	96.3
	Stanislaus	Titanox B-30	Tergitol #7	6/4-6		18,19		4	98.9
				6/9-11		22,23			
				7/23-29	47	42,44,45	43	10	72.3
				8/15-30		69-73		3	68.6
Butyl Ester	Plumas	Titanox B-30	Tergitol #7	7/22-29	46	40	41	3	97.7
				5/31		14			
						15			
						16			
						5		3	95.7
Ammonium	Stanislaus	Titanox B-30	Tergitol #7	8/9-12	60	61	62	3	83.7
				8/6-8	56	57	59	3	87.2
				5/31		13		3	97.3
				6/27		20,21			
				6/28-7/3		33,34			
Triethanolamine	Stanislaus	Titanox B-30	Tergitol #7	6/24-27		30,31		10	68.1
				7/3-15		35,38	39		
				7/1-5		36,37			
				5/28, 6/3, 11		9,17,24			
				6/17-20, 7/30		27,29,48,49	28	14	79.6
Total plots and average percent bush kill	Stanislaus	Titanox B-30	Tergitol #7	8/1-7	55	54,58	53		
				9/5-26		74,75			
				7/31-8/1	50	51	52	3	74.9
				5/28-29		10			
				6/14-17		11		5	99.2
Total plots and average percent bush kill	Stanislaus	Titanox B-30	Tergitol #7	8/13-15	66	67	68	3	72.4
				8/12-13	63	64	65	3	78.4
					8	57	10	75	80.5

*No 1947 check made on plots 1-3 (training area), and plots 29 and 49 (roadside only). On the 328 acres represented in these 75 plots there were 264,649 B. rosea and 6,703 B. nevadense.



TABLE 6
RESULTS OF 1946 PRACTICAL WORK OF 2,4-D SPRAY IN CALIFORNIA
(Individual Plots by Ribes Species, Based on 10% Check)

Plot Number	Plot Location	Date Treated	Method of Treatment	Type of 2,4-D and ppm (AE)	Other Chemical Added	Percent Kill		Current Season Seedlings	Percent Bush Survival			
						Stem	Bushes		Crown Sprouts	Stem Sprouts	Missed	
Ribes rosei												
9	Stanislaus N.F., Sec. 26, Camp 41	6/28	Spray 10 gal./sq. rod	NH ₄ - 720	Tergitol B-30	100	100	Very abund.	0	0	0	
10	do.	do.	do.	do.	do. Sulphur	99.9	98.9	Abund.	1.1	0	1.1	
11	do.	do.	do.	do.	do. Des.Wh.	100	100	Abund.	0	0	3.9	
12	do.	6/29	do.	do.	do. Vel.Wh.	99.9	99.7	Very abund.	0	0.3	1.5	
13	do.	6/31	do.	do.	do. Sulphur	99.9	98.6	Abund.	0.7	0.7	0	
14	do.	do.	do.	do.	do. do.	100	100	Occ.	0	0	0	
15	do.	do.	do.	do.	do. Des.Wh.	99.9	99.6	Abund.	0.4	0	1.6	
16	do.	do.	do.	do.	do. Vel.Wh.	99.9	94.7	do.	2.1	3.2	1.6	
17	do.	6/3	do. 5 gal./sq. rod	NH ₄ - 720	do. B-30	99.9	99.7	Common	0	0.3	0.7	
18	do.	6/4	do.	do.	do. do.	99.2	99.2	Very abund.	0.4	0	0	
19	do.	6/5	do. 10 gal./sq. rod	do.	do.	99.8	99.1	Rare	0.3	0.6	4.3	
20	do.	6/7	do.	do.	Butyl ester - 720	do. Des.Wh.	97.8	96.0	Occ.	2.0	2.0	2.0
21	do.	6/7	do.	do.	do.	do. Des.Wh.	99.7	97.0	Occ.	3.0	0	1.4
22	do.	6/9	do.	do.	do. - 720	do. B-30	99.9	99.3	Rare	0	0.7	8.5
23	do.	6/11	do.	do.	do. do.	100	100	Occ.	0	0	1.7	
24	do.	do.	do.	do.	do. do.	99.9	99.8	Occ.	0.2	0	2.4	
25	do.	6/14	do.	do.	do. do.	do. Sulphur	99.7	99.8	Rare	0	0.2	3.0
26	do.	do.	do.	do.	do. do.	do. Des.Wh.	99.7	99.4	Rare	1.1	0.5	2.6
27	do.	6/17	do.	do.	do. do.	do. B-30	96.2	84.2	Rare	15.0	0.8	5.2
28	do.	6/19	do.	do.	do. do.	do. do.	99.8	94.5	Rare	24.8	0.7	2.7
29	do.	7/22	do. and drench	do.	do.	do.	93.9	82.1	Common	17.2	0	2.1
30	do.	do.	do.	do.	do. - 1440	do.	93.9	70.6	Rare	28.4	0	4.1
31	do.	7/23	do.	do.	do. - 720	Tergitol B-30	98.3	86.6	Common	12.2	1.2	1.5
32	do.	7/24	do.	do.	do. - 1440	do. do.	90.2	77.1	Common	22.9	0	3.0
33	do.	do.	do.	do.	do. - 720	do. do.	99.2	96.0	Common	4.0	0	1.3
34	do.	7/26	Top spray only	do.	do.	do.	98.0	90.3	Common	9.7	0	0
35	do.	7/29	Spray 10 gal./sq. rod	do.	do.	do.	97.8	61.0	Common	37.8	1.2	0.6
36	do.	7/30	Spray and drench	do.	do.	Tergitol B-30	94.6	70.2	Common	26.7	3.1	1.0
37	do.	7/30	Spray and drench	NH ₄ - 720	do.	do.	99.7	99.5	Rare	0.5	0	1.2
38	do.	7/31	Spray 10 gal./sq. rod	do.	do.	do.	93.4	68.4	Common	30.6	1.1	1.7
39	do.	do.	do.	do.	do.	do.	94.7	72.6	Occ.	26.3	1.1	1.1
40	do.	8/1	Spray and drench	do.	do.	do.	96.0	87.4	Rare	12.5	0	0
41	do.	do.	do.	do.	do.	Tergitol B-30	99.7	80.4	Common	18.7	0.9	2.1
42	do.	8/2	Spray 10 gal./sq. rod	do.	do.	do.	98.2	32.4	Occ.	65.2	2.4	4.8
43	do.	8/5	do.	do.	do.	do.	96.3	78.8	Occ.	19.8	1.4	3.3
44	do.	8/6	do. 6 gal./sq. rod	Butyl ester 360	do.	do.	94.1	68.3	Rare	30.3	1.4	7.7
45	do.	8/6	do.	do.	do.	do.	90.4	58.5	Rare	9.6	0.1	2.4
46	do.	8/7	do. 10 gal./sq. rod	NH ₄ - 720	Tergitol B-30	97.1	89.8	Rare	10.2	0	10.2	
47	do.	8/7	do.	do.	do.	do.	93.7	81.6	Rare	13.4	0	2.2
48	do.	8/9	do.	do.	do.	do.	92.5	80.9	None	15.9	3.2	8.4
49	do.	8/9	do.	do.	do.	do.	95.9	91.4	Rare	7.6	1.0	1.6
50	do.	8/12	do.	do.	do.	do.	94.7	73.9	Rare	26.1	0	3.3
51	do.	do.	do.	do.	do.	do.	90.7	71.3	Rare	23.3	5.4	1.8
52	do.	do.	do.	do.	do.	do.	94.7	79.7	Rare	19.8	0.5	5.2
53	do.	8/13	do.	do.	do.	do.	94.1	78.9	Rare	21.1	0	0.8
54	do.	do.	do.	do.	do.	Tergitol B-30	90.9	79.2	Rare	19.0	1.1	0.7
55	do.	8/14	do.	do.	do.	do.	95.1	65.2	Rare	34.8	0	3.3
56	do.	8/15	do.	do.	do.	do.	94.4	71.7	Rare	27.8	0.5	0.4
57	do.	do.	do.	do.	do.	do.	92.6	72.9	Rare	22.5	4.6	10.4
58	do.	8/16	do.	do.	do.	do.	89.3	63.8	Rare	33.4	2.8	4.4
59	do.	8/20	do.	do.	do.	do.	99.3	60.6	Rare	37.1	2.3	1.1
60	do.	8/26	do.	do.	do.	do.	89.8	60.6	Rare	36.2	3.2	3.7
61	do.	8/28	do.	do.	do.	do.	93.4	76.0	Rare	22.7	1.3	4.6
62	do.	9/5	do.	do.	do.	do.	81.1	62.2	Rare	21.7	1.4	8.9
63	do.	9/26	do.	do.	do.	do.	AMP	63.6	None	19.7	26.0	1.9
64	Plumas N.F., Sec. 20, Rook Creek Ridge	6/20	do.	do.	do.	Tergitol B-30	99.3	93.1	Rare	1.5	5.4	1.7
65	do.	6/21	do.	do.	do.	do.	96.0	93.3	Common	1.3	4.8	8.7
66	do.	6/22	do.	do.	do.	do.	99.4	97.8	Occ.	1.8	0.4	5.6
67	do.	6/23	do.	do.	do.	do.	96.0	96.3	Rare	1.6	2.1	4.7
68	do.	6/24	do. 5 gal./sq. rod	Butyl ester 360	do.	do.	96.9	95.5	Rare	1.0	3.5	8.0
69	do.	6/27	Top spray only	NH ₄ - 720	do.	do.	97.8	95.9	Rare	2.9	1.2	5.1
70	do.	6/27	do.	do.	do.	do.	94.0	94.4	None	0	5.6	5.6
71	do.	6/28	Spray 10 gal./sq. rod	do.	do.	do.	97.3	96.4	Rare	3.2	0.4	3.6
72	do.	6/28	do.	do.	do.	do.	99.4	97.3	Occ.	2.1	0.4	1.1
73	do.	7/2	do.	do.	do.	do.	85.3	54.8	None	45.2	0	0
74	do.	7/3	Spray and drench	do.	do.	do.	87.6	61.5	None	38.5	0	0
75	do.	7/7	Spray 10 gal./sq. rod	do.	do.	do.	99.7	96.3	Rare	1.6	2.1	8.3
76	do.	7/8	do.	do.	do.	do.	99.5	57.0	None	43.0	0	0
77	do.	7/15	Spray and drench	do.	do.	do.	99.6	60.6	Rare	38.3	1.1	1.1
78	do.	do.	do.	do.	do.	do.	87.3	26.3	None	74.7	0	0
Ribes nevadense												
9	Stanislaus N.F., Sec. 26, Camp 41	6/8	Spray 10 gal./sq. rod	NH ₄ - 720	Tergitol B-30	100	100		0	0	0	
10	do.	do.	do.	do.	do. Sulphur	100	100		0	0	0	
11	do.	do.	do.	do.	do. Des.Wh.	100	100		0	0	0	
12	do.	6/29	do.	do.	do. Vel.Wh.	100	100		0	0	0	
13	do.	6/31	do.	do.	do. Sulphur	100	100		0	0	0	
14	do.	do.	do.	do.	do. do.	100	100		0	0	0	
15	do.	6/3	do. 6 gal./sq. rod	NH ₄ do.	do. B-30	100	100		0	0	0	
16	do.	6/6	do. 10 gal./sq. rod	do.	do.	do.	99.8	95.6		0	6.4	7.9
17	do.	6/7	do.	do.	do.	do.	99.2	99.2		0	0	0
18	do.	6/9	do.	do.	do.	do.	99.8	96.7		0	3.3	3.3
19	do.	6/11	do.	do.	do.	do.	do.	100	100	0	0	0
20	do.	6/14	do.	do.	do.	do.	do.	100	100	0	0	0
21	do.	6/17	do.	do.	do.	do.	do.	100	100	0	0	0
22	do.	6/19	do.	do.	do.	do.	do.	100	100	0	0	0
23	do.	6/21	do.	do.	do.	do.	do.	100	100	0	0	0
24	do.	6/24	do.	do.	do.	do.	do.	100	100	0	0	0
25	do.	6/24	do.	do.	do.	do.	do.	100	100	0	0	0
26	do.	6/24	do.	do.	do.	do.	do.	100	100	0	0	0
27	do.	6/17	do.	do.	do.	do.	do.	100	100	0	3.8	3.8
28	do.	6/19	do.	do.	do.	do.	do.	100	100	0	2.7	1.7
29	do.	7/26	Top spray only	do.	do.	do.	0	0	50.0	50.0	0	0
30	do.	7/29	Spray 10 gal./sq. rod	do.	do.	do.	100	100	0	0	0	0
31	do.	7/30	Spray and drench	NH ₄ - 720	do.	do.	100	100	0	0	0	0
32	do.	7/30	Spray and drench	do.	do.	do.	100	100	0	0	0	0
33	do.	7/30	Spray and drench	do.	do.	do.	100	100	0	0	0	0
34	do.	8/1	Spray 10 gal./sq. rod	do.	do.	do.	100	100	0	0	0	0
35	do.	8/4	do.	do.	do.	do.	100	100	0	0	0	0
36	do.	8/6	do.	do.	do.	do.	100	100	0	0	0	0
37	do.	8/8	Spray 5 gal./sq. rod	Butyl ester - 360	do.	do.	100	100	0	0	7.0	0
38	do.	8/8	do.	do.	do.	do.	100	100	0	0	11.6	0
39	do.	8/7	Spray 10 gal./sq. rod	NH ₄ - 720	Tergitol do.	100	100	0	0	0	0	0
40	do.	8/9	do.	do.	do.	do.	100	100	0	0	0	0
41	do.	8/9	do.	do.	do.	do.	100	100	0	0	60.0	0
42	do.	8/12	do.	do.	do.	do.	100	100	0	0	28.7	0
43	do.	8/12	do.	do.	do.	do.	100					



TABLE 7

COMPARISON OF THE PERCENT BUSH KILL OBTAINED FROM
THE PRACTICAL AND THE CONTROLLED DOSAGE TESTS OF 2,4-D
IN 1946

Location	Date treated	Method of treatment	Type of 2,4-D and ppm (AE)		% bush kill	
					Pract. work	Test plots
Stanislaus NF Camp 41	Ribes roezli					
	5/28	Spray, 10 gal./sq.rod	NH ₄	720	99.7	100
	5/31	do.	Butyl ester	720	98.6	100
	do.	do.	Na	720	98.7	100
	6/3	Spray, 5 gal./sq. rod	NH ₄	720	99.7	100
	6/4	do.	Na	720	99.6	100
	6/5	Spray, 10 gal./sq.rod	do.	720	99.1	100
	6/7	do.	Butyl ester	720	96.6	100
	6/9	do.	Na	720	99.0	100
	6/11	do.	NH ₄	720	99.8	100
	7/22	Spray and drench	Na	720	82.1	80
	do.	do.	do.	1440	70.6	69
	7/23	do.	do.	720	86.6	20
	7/24	do.	do.	1440	77.1	24
	do.	do.	do.	720	96.0	20
	7/31	Spray, 10 gal./sq.rod	NH ₄	360	68.4	53
	do.	do.	do.	720	72.6	71
	8/1	Spray and drench	do.	1440	87.4	81
	do.	Spray, 10 gal./sq.rod	do.	1440	80.4	70
	8/2	do.	do.	720	32.4	37
	8/5	do.	do.	360	78.8	28
	8/7	do.	do.	720	89.8	44
	8/13	do.	Trieth.	360	79.9	29
	8/14	do.	do.	720	65.2	6
	8/15	do.	do.	1440	71.7	0
Plumas NF Rock Cr. Ridge	5/21	Spray, 10 gal./sq.rod	Butyl ester	720	96.1	100
	5/24	Spray, 5 gal./sq. rod	do.	720	95.5	79
	6/28	Spray, 10 gal./sq. rod	NH ₄	720	96.9	93
	7/1	do.	do.	720	96.3	93
Plumas NF Lewis Ridge	7/15	Spray and drench	do.	720	60.6	5
	do.	do.	do.	1440	25.3	3
Stanislaus NF Camp 41	Ribes nevadense					
	5/29	Spray, 10 gal./sq.rod	NH ₄	720	100	100
	5/31	do.	Na	720	100	100
	6/3	Spray, 5 gal./sq. rod	NH ₄	720	100	100
	6/5	Spray, 10 gal./sq.rod	Na	720	93.6	100
	6/9	do.	do.	720	97.1	100

CHEMICAL TESTS OF 1947

New Equipment and Methods

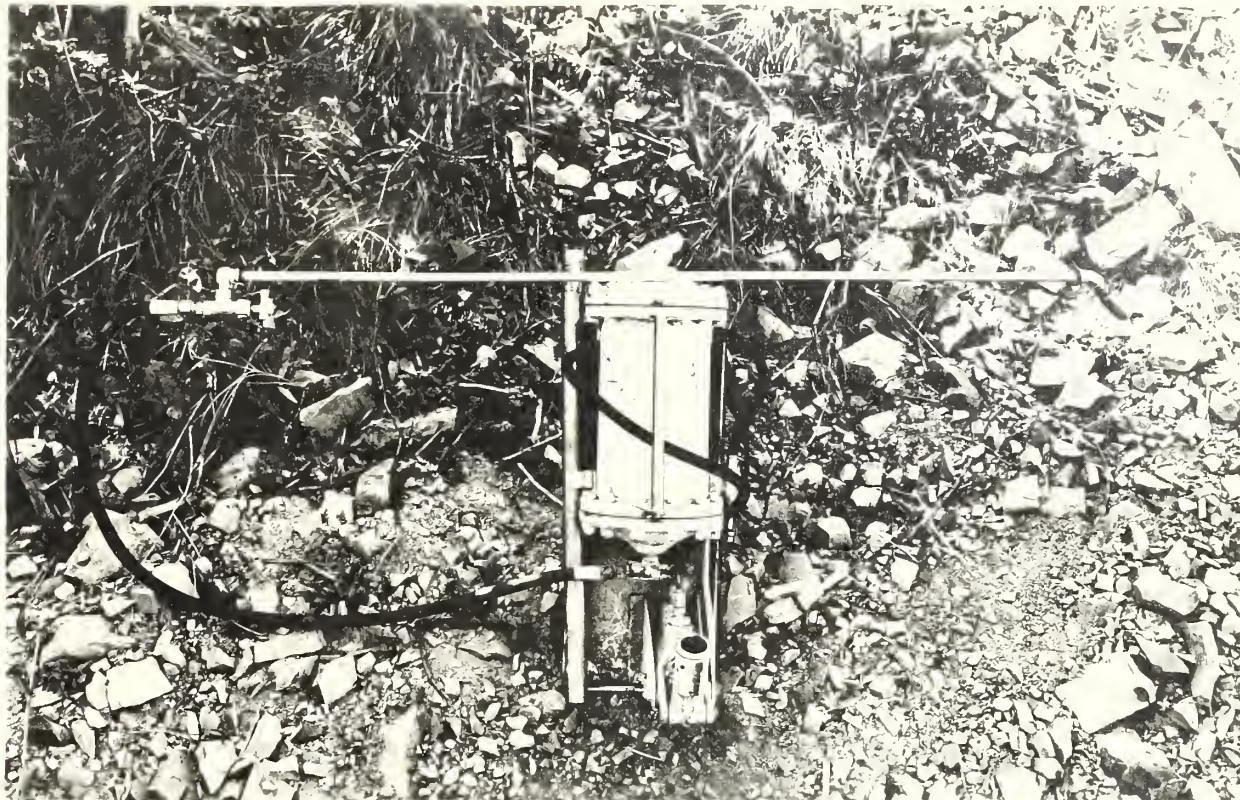
The objectives of the 1947 chemical tests have already been given in the introductory section of this report "Highlights of the 1947 season." New developments of special interest to operations work are (1) application of 2,4-D or 2,4,5-T aqueous and oil concentrates in fine mist form by the Hi-Fog-Gun, (2) basal stem treatment of large erect or semi-erect ribes with aqueous and oil concentrates of 2,4-D, (3) further testing of 2,4-D ester dusts by small hand duster and by an improvised power duster.

The Hi-Fog-Gun manufactured under patent by Banta and Driscoll Co., Los Angeles, California, was tested thoroughly throughout the season on the principal ribes of Oregon and California. This 26 1/2-pound knapsack type high pressure sprayer (Banta and Driscoll Model B) has a capacity of 3 5/5 liquid pints and operates between a maximum of 1,000 pounds and a minimum of 350 pounds pressure to produce a finely atomized spray. Particle size of the mist spray can be varied by changing the nozzle head. For spraying seedlings and small bushes an orifice size of .016" diameter (No. 60 Spraying System Co. nozzle) was found to be most economical and effective; for larger bushes a No. 1 nozzle orifice, diameter 0.02" was preferred. For treatment of basal stems a drenching spray gave best results and for this work a 50° flat fan-atomizing nozzle was used.

Several field trials were made in which companion strips of ground supporting numerous ribes were sprayed with the Hi-Fog-Gun and with conventional hose and nozzle from a power sprayer. The man with the Hi-Fog-Gun moved almost twice as fast as the man with the regular spray nozzle. The Hi-Fog-Gun was especially advantageous for ribes in heavy brush, for large and scattered ribes, and for dense patches of small seedlings. Final observations on the kill obtained with the Hi-Fog-Gun cannot be made until the spring of 1948. The construction of the Hi-Fog-Gun precludes the use of a marker such as Titanox B-30, and the small volumes of 2,4-D employed call for careful work by skillful and dependable operators. The chief disadvantage of the Hi-Fog-Gun is in not being able to see clearly when the ribes has been completely covered with the fine mist. Details of the construction of the Hi-Fog-Gun and the manner in which it is carried and used for spraying ribes are shown in plate 1.

A pint size oil can of the squirt or plunger type was found to be a cheap and effective unit for wetting the basal stems. The same container is handy for applying 2,4-D liquids to ribes crowns in the standard decapitation treatment.

In testing 2,4-D concentrates as sprays, a conventional paint gun of the syphon type was operated by air pressure from a small air compressor. This same air compressor served as a power duster by attaching a small hopper and dust nozzle to the end of the air-line by means of a Hansen pneumatic quick coupling. A quart size household type fly sprayer was also used for experimental spraying of 2,4-D concentrates. The fly sprayer and the paint gun are rated inferior to the Hi-Fog-Gun for the field problems under study.



W-438

Hi-fog gun showing cylinder of 3 pint capacity, hydraulic pump, and solution intake hose. Pump handle is carried left of cylinder. 350 lb. nitrogen charge is located in cylinder top. Pressure of gun when fully charged is 1,000 lbs. Pipe extension for nozzle is 1/8-inch diameter and 36 inches long. 45 degree elbow on pipe mounts atomizing nozzle head. Weight of empty gun is 26½ lbs.



W-436

Hi-fog gun in operation showing position carried on back and how nozzle extension is held to direct mist spray over bush. Spray is being dispersed through a number .60 atomizing nozzle head.



All dilute sprays in the controlled dosage series were applied by the Blackmer pump powered by the 1 h.p. Lauson air-cooled motor. This unit is illustrated in plate 2, page 134, of the 1946 annual report for the Pacific Coast Region.

On Mooreville Ridge, Plumas N.F., and Gertrude Creek, Sierra N.F., two series of experimental mid-season spray plots were established by the large power rigs. The purposes of these tests were (1) to determine the effectiveness of heavy soil drenches for reducing the number of crown sprouts, and (2) to test the desirability of lowering concentration of aerial spray along with the increase of total dosage applied to the crowns. Each plot was 1/2 acre or more in size.

Details of the 1947 experimental plot work are given in table 8, showing that 281 permanent chemical plots were treated.

Re-spray Tests

The field season of 1947 provided the first opportunity to test adequately the effectiveness of 2,4-D sprays when used for the second time (rework) to kill crown sprouts from partially killed bushes. Previous tests had indicated that crown sprouts and partially killed bushes from the previous year's work could be killed by a second spraying provided it was done early in the growing season. The more extensive tests of 1947 showed that re-spray work should not be started quite as early in the growing season as initial spray work. A delay of perhaps two weeks is indicated.

In the following list of re-spray plots the first number is the 1947 plot number and the number in parenthesis is the number of the 1946 plot that was re-sprayed: 38 (317-319 all part of big rig plot 7), 83 (309, 312, 313, 316), 84 (305, 308), 141-144 (part of plot 62), 149 (216), 161-164 (part of plot 57), 165-170 (part of plot 215), 171 (61-64), 221 (254), 222 (255), 223 (256), 224 (257), 225 (258), 226 (239-243), 227 (264-268), 236 and 240 (part of plot 61).



TABLE 8

1947 TALLY SHEET OF CALIFORNIA AND OREGON TEST PLOTS

Item	Formulation in ppm or Percent	Forest	Spreader	Dosage Rate	Ribes Species	Date Treated	1947 Plot Numbers	Total Plots
2,4-D - Sodium Salt in Water								
1	2000,1000, 500, 250, 125, 75	Siskiyou	Tergitol	5 gal.	lob., sang. marsh.	5/19	76-81	6
2	2000,1000, 500, 250, 125	Sierra	do.	do.	nev., roez.	6/12	130-134	5
3	2000,1000, 500, 250, 125	Stanislaus	do.	do.	roez., nev.	6/18	150-154	5
4	750	Plumas	do.	do.	roez., nev.	7/22		1
5	2000,1000, 500, 250	Sierra	do.	do.	roez.	7/24	217-220	4
6	1000 (720 Na + 280 NH ₄)	Plumas	do.	5-10 gal.	roez.	8/7		1
2,4-D - Triethanolamine Salt in Water								
7	20%	Lassen	None	Mist	roez.	4/10	11	1
8	24.6, 12.24, 3.6, 1.2%	Siskiyou	None	Decap.	crul., klam.	4/20-22		7
9	1000, 500, 250, 125, 62 1/2, 2000	Sierra	Tergitol	5 gal.	roez., nev.	5/1	14-19	6
10	6, 12, 24, 30%	Siskiyou	None	Decap.	sang.	5/8		4
11	2000, 1000, 500, 250, 125, 62 1/2	Plumas	Tergitol	5 gal.	roez.	5/12, 14	30-35 39-44	12
12	10%	Plumas	None	Mist	roez.	5/13	38	1
13	20, 10, 5, 1%	Rogue River	None	Mist	sang., visc., eryth.	5/16	45-48, 50-53	8
14	20%	Rogue River	None	Mist	binom., lac.	5/16	56	1
15	20, 10, 5, 1%	Siskiyou	None	Mist	klam.	5/18	57-60	4
16	10%	Stanislaus	None	Mist	nev., roez.	5/22		1
17	2000, 1000, 500, 250, 125	Lassen	Tergitol	5 gal.	cereum.	5/25	98-102	5
18	20, 10, 5, 1%	Lassen	None	Mist	cereum., nev.	5/25	103-110	8
19	20, 10, 5, 1%	Sierra	None	Mist	nev., roez.	6/10	111-114	4
20	2000, 1000, 500, 250, 125	Sierra	Tergitol	5 gal.	nev., roez.	6/11	115-119	5
21	20, 10, 5, 1%	Stanislaus	None	Mist	roez., nev.	6/17, 30	145-148, 161-164	8
22	1000, 500, 250	Sierra	None	5, 10, 20 gal.	nev., roez.	7/14, 15		9
23	20, 10, 5, 1%	Siskiyou	None	Mist	lob., sang., lac., marsh.	7/17	193-196	4
24	2000, 1000, 500, 250, 125	Stanislaus	Tergitol	5 gal.	roez.	7/30	221-225	5
25	20, 10, 5, 1, 1/2%	Stanislaus	None	Mist	roez.	8/1	236-240	5
26	20%	Plumas	None	Basal stem	roez.	8/7	252, 254	2
27	20, 10%	Lassen	None	Basal stem	cereum.	8/8	257, 260	2
28	20, 10%	Sierra	None	Basal stem	nev., roez.	8/14	265, 265	2
29	20, 10, 5, 1%	Sierra	None	Basal stem	roez., nev.	9/10	271-274	4
30	20, 10, 5, 1% + 1% sugar	Sierra	None	Decap.	nev., roezl.	9/10		4
2,4-D Butyl Ester in Water								
31	20, 10, 5, 1%	Siskiyou	None	Mist	klam.	5/18	61-64	4
32	1000, 500, 250, 125, 62 1/2	Siskiyou	Tergitol	5 gal.	klam.	5/18	65-69	5
33	2000, 1000, 500, 250, 125, 75	Siskiyou	Tergitol	5 gal.	sang., lob., visc., marsh.	5/19	70-75	6
34	20, 10, 5, 1%	Sierra	None	Mist	nev., roez.	6/11	120-123	4
35	2000, 1000, 500, 250, 125	Sierra	Tergitol	5 gal.	nev., roezl.	6/11	124-128	5
36	5%	Siskiyou	None	Mist	klam.	7/11	171	1
37	20, 10, 5, 1%	Rogue River	None	Mist	eryth., visc., binom.,	7/14	183-186	4
38	250	Plumas	Tergitol	5 gal.	roez.	7/16		1
39	2000	Rogue River	Tergitol	10 gal.	cer., vis., binom.	7/21		1
2,4-D - Butyl Ester in Pure Kerosene								
40	20, 10, 5, 1%	Stanislaus	None	Mist	roez., nev.	6/17	141-144	4
41	20	Plumas	None	Basal stem	roez.	8/7	251, 253	2
42	20, 10%	Lassen	None	Basal stem	cereum.	8/8	256, 259	2
43	20, 10%	Sierra	None	Basal stem	nev., roez.	8/14	269, 270	2
44	20, 10, 5%	Sierra	None	Basal stem	nev., roez.	9/10	275-277	3
45	20, 10, 5%	Sierra	None	Decap.	nev., roez.	9/11		4
46	20, 10, 5, 1%	Sierra	None	Basal stem	cer., roez., nev.	9/12	278-281	4
2,4-D - Methyl Ester								
47	20%	Plumas	None	Decap.	nev., roez.	5/8		1
48	5% in pure kerosene	Rogue River	None	Mist	vis., lac., binom.	5/16	54, 55	2
49	5% in pure kerosene	Siskiyou	None	Mist	lac.	5/19	82	1
50	2000, 1000 in water	Rogue River	Tergitol	10 gal.	cer., lob., vis., binom., lac., eryth.	7/23		2
51	1, 1/2% in water	Stanislaus	None	Mist	roez.	7/30	226, 227	2



TABLE 8 (continued)

1947 TALLY SHEET OF CALIFORNIA AND OREGON TEST PLOTS

Item	Formulation in ppm or Percent	Forest	Spreader	Dosage Rate	Ribee Species	Date Treated	1947 Plot Numbers	Total Plots
2,4-D - Iso-propyl Ester in Pure Kerosene								
52	20, 10%	Laessen	None	Mist	roezli	4/10	1,2	2
53	5, 1, 1, 20, 20%	Laessen	None	Mist	roezli	4/10	3, 4, 8-10	5
54	1, 20%	Laessen	None	Decap.	roez., nev.	4/10		2
55	20, 5%	Laessen	None	Mist	nev.	4/11	12, 13	2
56	20%	Laessen	None	Basal stem	nev.	4/11		2
57	20, 20, 10%	Laessen	None	Decap.	nev.	4/11		2
58	1%	Laessen	None	Decap.	nev.	4/11		1
59	20, 10, 10, 5%	Sierra	None	Mist	roez., nev.	5/1	20-23	4
60	20, 10, 5, 1%	Plumas	None	Mist	roezli	5/7	25-28	4
61	5, 1%	Plumas	None	Mist	roez., nev.	5/13	36, 37	2
62	5%	Rogue River	None	Mist	sang., lob., lac.	5/20	83, 84	2
63	20, 10, 5, 1%	Rogue River	None	Mist	lac., binom., vis., lob.	5/21	89-92	4
64	10%	Klamath	None	Mist	binom., lob., lac.	5/22	97	1
65	20, 10, 5, 1%	Sierra	None	Mist	roez., nev.	7/22	199-202	4
66	20%	Stanislaus	None	Basal stem	roez., nev.	7/31	234, 235	2
67	20, 10%	Laessen	None	Basal stem	ceram.	8/8	255, 258	2
68	20, 10%	Laessen	None	Decap.	nev.	8/8		2
69	10%	Laessen	None	Basal stem	nev.	8/8		1
70	20, 10%	Sierra	None	Basal stem	nev., roez.	8/14	267, 268	2
71	20, 10, 5%	Sierra	None	Decap.	nev.	8/14		3
2,4-D - Iso-propyl Ester Dust								
72	5%	Laessen			roez.	4/10	5-7	3
73	5%	Sierra			roez., nev.	5/1	24, 129	2
74	5%	Plumas			roez.	5/8	29	1
75	5%	Stanislaus			roez., nev.	6/17	149	1
76	5%	Rogue River			sang., vlec., eryth.	5/16, 7/14	49, 187	2
77	5%	Siskiyou			sang., lob.	7/17	197, 198	2
2,4-D - Ammonium Salt								
78	250	Plumas	Tergitol	5 gal.	roezli	7/16		1
79	1000, 500, 250	Plumas	Tergitol	5, 10, 20 gal.	roezli	7/16-21		9
80	750	Plumas	Tergitol		roezli	7/21		1
81	1000	Rogue River	None		lob., sang., cer., vlec.	7/21		1
82	King Series:	Stanislaus	None	5 gal.	roez., cer.	6/16	135-137	3
83	a. 1000 ppm ammonium salt of 2,4-D	Stanislaus	None	5 gal.	roez., nev.	6/25	158-160	3
84	b. 1000 ppm ammonium salt of 2,4-D	Stanislaus	None	5 gal.	roezli	6/30	168-170	3
85	+ 1000 ppm glycerol	Siskiyou	None	5 gal.	klam.	7/11	175-177	3
86	c. 1000 ppm ammonium salt of 2,4-D	Sierra	None	5 gal.	nev., roez.	7/23	206-208	3
87	+ 1000 ppm glycerol	Stanislaus	None	5 gal.	roezli	7/31	228-230	3
88	+ 1000 ppm potassium chloride + 1500 ppm ammonium phosphate	Plumas	None	5 gal.	roezli	8/6	248-250	3
2,4,5 - Sodium Salt								
89	King Series:	Stanislaus	None	5 gal.	roez., vlec.	6/16	138-140	3
90	a. 1000 ppm sodium salt of 2,4,5	Stanislaus	None	5 gal.	roez., nev.	6/24	155-157	3
91	b. 1000 ppm sodium salt of 2,4,5	Stanislaus	None	5 gal.	roezli	6/30	168-167	3
92	+ 1000 ppm glycerol	Siskiyou	None	5 gal.	klam.	7/11	172-174	3
93	c. 1000 ppm sodium salt of 2,4,5	Sierra	None	5 gal.	nev.	7/23	203-205	3
94	+ 1000 ppm glycerol + 1000 ppm potassium chloride + 1500 ppm ammon. phosphate	Stanislaus	None	5 gal.	roezli	7/31	231-233	3
95		Plumas	None	5 gal.	roezli	8/6	245-247	3
96	125, 500, 250, 1000	Rogue River	Tergitol	5 gal.	vis., lac.	5/21	85-88	4
97	2000, 1000, 500, 250	Klamath	Tergitol	5 gal.	binom., sang., lac., lob.	5/22	93-96	4
98	2000, 1000, 500, 250, 125	Umpqua	Tergitol	5 gal.	lac.	7/14	178-182	5
99	2000, 1000, 500, 250, 125	Siskiyou	Tergitol	5 gal.	lob., sang., marsh.	7/17	188-192	5
100	2000, 1000, 500, 250	Sierra	Tergitol	5 gal.	roezli	7/24	213-261	4
101	2000, 1000, 500, 250	Plumas	Tergitol	5 gal.	roezli	8/6	241-244	4
2,4,5-Triethanolamine								
102	2000, 1000, 500, 250	Sierra	Tergitol	5 gal.	nev., roez.	8/14	261-264	4
4-Chlorotoloxycetic Acid								
103	2000, 1000, 500, 250	Sierra	None	5 gal.	nev., roez.	7/23	209-212	4



SECTION II. RIBES ECOLOGY IN SUGAR PINE FORESTS, 1947.

A general statement of the ecology of the ribes associated with sugar pine, a condensation of Serial Report #132, is a part of last year's annual report. The present report is concerned largely with recent developments on various series of ribes ecology plots.

I. The One-Acre Ribes Regeneration Plots.

See the 1945 annual report, pp. 107, 108, 113, and 114.

These one-acre plots continue to yield valuable and interesting ecologic results. Appended tables 1 and 2 summarize data recently collected from the 8 plots of this series located on the Sierra N.F. and the Plumas N.F.

The Shaver (Logged) Timber Plot near Shaver Lake, given initial ribes eradication in mature timber in 1939, logged with a heavy cut in 1941, and re-eradicated by Quick in 1945, is considered in some detail in Serial Report #134, Effects of Logging of Virgin Timber on Ribes Regeneration in the Central Sierra Nevada, dated at Berkeley on January 14, 1947.

Very few of the 996 ribes bushes removed from this acre in 1945 and 1946 were fruiting at time of removal, and the ribes seedlings currently appearing on the plot, therefore, are largely from "duff-stored" seeds. The writer has several times suggested that a ribes eradication program can be most propitiously started immediately after logging, or after other severe disturbance. To some extent this plot is, or is not, the "proof of the pudding." The ribes were reduced to very low bush-count and live-stem figures in 1939, 2 years before logging. Very considerable numbers of ribes seedlings appeared in 1942, including a number of seedlings of R. viscosissimum, a species not observed on the plot prior to logging. The first crop of seedlings grew very vigorously, and a few bushes developed fruits in 1945. The plot was reworked in 1945, and "cleaned-up" the following year, that is, only current-season seedlings (117 CSS) were left on the acre in 1946. The inspection of June 25, 1947, revealed more seedlings than were expected, after the relatively few that appeared in 1946. Future inspections of this plot plan to follow occurrence and growth of ribes which develop after logging on an area on which ribes are not permitted to fruit in any appreciable quantity. At the present time we have no extensive data of this sort for direct comparison with data from areas, e.g., section 34, Cow Creek area, on which ribes eradication was started, not immediately after logging, but subsequent to the development of a large and vigorously fruiting population of gooseberries.

The Blue Canyon one-acre plot near Shaver Lake, and the data collected from it, are considered in some detail in Serial Report #133, Decadence of a Gooseberry Population in an Open Pole Stand Near Shaver Lake, dated at Berkeley on January 2, 1947. This plot has been on practical maintenance since the ribes were re-eradicated by the writer in 1944. Only 2 ribes with a total of 0.7 foot of live stem were known on the acre in 1946. The plot supported a reasonably good stand of pole-size white fir and sugar pine.

In 1945, 178 sugar pines were known on the acre. The pine and ribes conditions on the plot looked very favorable when inspected on June 27, 1947, but in August of 1947 the plot was burned over by the Bretz Fire. All conifers on the area were dead when the plot was observed on December 23, 1947. Two monarchal sugar pine trees just southeast of the plot, perhaps 400-500 years old and left uncut for some unknown reason in the donkey logging around 1915, were killed by the fire. It would seem that Nature can take better care of her sugar pine forests than can man.

Ribes on the Pilot Peak plot west of Westphal R.S. (Miami R.S.) have not been re-eradicated since 1940. Regrowth of ribes individuals and populations has been slow. A thorough eradication now should put all but a small portion of the plot acre on maintenance. The difficulties of a "close" eradication, however, are considerable. A sizable portion of the plot is covered with an unusually tall and vigorous growth of bear-clover (Chamaebatia foliolosa). Gooseberries are extremely hard to find in bear-clover, in fact, some known ribes on the plot predate the initial eradication of 1937.

The Signal Peak one-acre plot on Chowchilla Mt. is an old favorite, and continues to live up to its reputation. A description of this plot, and a summary of the data collected through 1944 were presented in Serial Report #124, An Ecologic History of a Ribes Population on an Upland Plot in the Central Sierra Nevada, dated at Berkeley on April 20, 1945. Data in table 1 of the present report show that this plot, after 3 ribes eradication (the last in 1944), had climbed again to 150 ribes per acre. There were, however, actually fewer ribes with 3 or more feet of live stem on the plot in 1947 than in 1946. If this decrease was due to drought, further reductions of live stem on some bushes may be expected in 1948.

The Inter-Road plot on Big Bar Mt. (Plumas N.F.) is perhaps approaching ribes maintenance conditions. It is somewhat discouraging to note that the re-eradication of 1946 only reduced the known ribes from 37 to 27 bushes. The pressing problem on such areas is how to find economically the few remaining ribes.

A similar, but more aggravating picture appears in the summary of data from the Gentle Gully plot. Inspection of this plot on August 21, 1946, was made shortly after the plot had been worked by regular field crews, but before the regular check. Data of the check indicated that the area which included the plot did not approximate closely enough a ribes-free area, and the plot and surrounding areas were re-worked in 1946. See table 2. The re-work considerably reduced the ribes live-stem, but reduced the number of bushes relatively much less. The problem of "close" eradication of small ribes in dense deciduous mesophytic mixed brush is extremely difficult.

Number of ribes on the Rock Creek plot southeast of Meadow Valley has steadily declined for the past 3 years, but live stem has about as steadily increased. Many ribes on this plot are currants (Ribes nevadense), and the plot is not as near maintenance conditions as the mature timber and slow regrowth of ribes would indicate. A swale through the plot, sometimes with and sometimes without a surface stream, will offer a satisfactory habitat for the shade-tolerant R. nevadense more or less perennially. Much of the plot is practically ribes-free. The plot offers a good example of the ecologic niche-mosaic type of ribes distribution.

The Fanianni plot southwest of Lake Almanor was logged with a light cut in 1942, and ribes seedlings in considerable numbers appeared on disturbed subplots shortly thereafter. By 1947 a few of the ribes were fruiting, and all known ribes were removed by the writer. Data collected in the future from this plot will bear on the important uncertainty of length of post-logging regeneration of gooseberries from "duff-stored" seeds.

II. The Cow Creek 10-Acre Plot (CFES, MC #5).

See the 1945 annual report, pp. 106, 110. A summary of early data from this plot is presented in the 1940 annual report, pp. 126-130, 132-136.

Some 10 years ago this plot was subdivided into 100 one-chain-square subplots. In 1941, 10 of these one-tenth-acre subplots were selected as representative of the plot as a whole, and all known ribes were removed from them. Ribes were not removed from the rest of the plot. An additional 10 subplots were selected to represent conditions on the portions of the plot where the ribes were left in place. The 20 subplots of the two selected series have been inspected annually since 1941. Ribes were eradicated from the whole 10-acre plot by a routine field crew in 1947.

Table 3 summarizes recent data from the selected 10 subplots eradicated (by the writer) in 1941. Regrowth of ribes since 1941 has been slow, only 50 or so feet of ribes live stem was known on the acre prior to the routine crew eradication in 1947. The crew did not greatly reduce the number of small bushes on this acre, probably because the rest of the 10-acre plot was initial ribes eradication and these 10 interspersed relatively ribes-free subplots were worked unconsciously more to initial eradication standards than to re-eradication standards. Study of the growth of the small bushes, and the occurrence of additional ribes should be continued on this series of plots.

Table 4 summarizes recent data from the 10 subplots inspected annually, but uneradicated until 1947. Disregarding variations in inspection intensity, etc., it appears that from this acre the eradication crew removed 102 bushes with 3730 feet of live stem, and left 50 bushes with 193 feet of live stem. Circumstances of the season prevented any consideration of rework by regular eradication crews in 1947. Large portions of this plot are quite brushy, and small ribes are extremely difficult to find. See the 1940 annual report. A glance at the last series of columns of table 3 indicates that even the writer doesn't see all the little gooseberries the first time he looks for them.

III. The Four Enclosure Plots.

See the 1945 annual report, pp. 108, 114-116.

These plots were established in 1940, and since have been inspected once or twice each year. All known ribes were removed in the fall of 1940, and the plots were cleaned up in the spring of 1941, that is, all ribes older than current-season seedlings were removed. All known ribes

other than current-season seedlings were removed by the writer in 1947.

Data from these plots are now being summarized by Mr. F. A. Patty and Mr. D. L. Westberg of the Regional BRC Office in Berkeley. When these summaries are completed, and as time and opportunity permit, the preparation of one or more detailed Serial Reports is contemplated. For this reason no summary of data is presented herewith. In general it may be said that previously expressed trends are continuing: (1) more seedling ribes are appearing outside the fence than inside, (2) ribes growth is generally more rapid outside, (3) but more and smaller ribes produce fruit inside the fence, and (4) vegetative cover is advancing more rapidly towards the climax condition inside the fence.

IV. Burn Plots.

See the 1945 annual report, p. 107.

All known ribes were removed by the writer from the burn plots in 1947. As rapidly as time and opportunity permit, Serial Reports will be prepared to summarize the collected data. The development of ribes plants and populations on these plots from 1948 current-season seedlings should be of considerable interest. In general very few ribes seedlings, from seeds stored in the duff prior to the burn, appear on burned areas more than one or two seasons after a fire.

V. Seedling Growth-Rate Plots.

In 1947 several small plots started in 1937 and designed to yield detailed data on the occurrence and growth of ribes seedlings in competition with other vegetation were inspected perhaps for the last time. Plots in this category are Cow Creek plots "A", "B", "C", and "D"; Chowchilla Mt. plots "E", "F", and "G"; Spanish Ranch Ridge (Mt. Home Ridge) seedling plots; and Butt Creek seedling plots I and II. Cow Creek plot "C", and Chowchilla Mt. plots "E" and "F" may be continued for a few more years if time and other duties permit.

It is hoped that one or more Serial Reports may be issued on these several plots. With this in mind, no summary of data is presented herewith.

VI. Occurrence of Current-Season Seedlings.

See 1945 annual report, pp. 106, 107, 111.

Due to pressure of other duties, the Cow Creek 1.6-acre seedling-occurrence and seedling-growth-rate plot was not inspected in 1947.

Table 5 summarizes numbers of current-season ribes seedlings observed in 1944 through 1947 on sundry small plots, mostly on the Sierra N.F. It appears that at long last the troublesome seedling areas on Cow Creek and Chowchilla Mt. are rapidly "running down."

VII. Viable Seeds in the Forest Floor.

In 1948 the Division of Forest Management of the California Forest Experiment Station plans to start a series of logging experiments to further define and to demonstrate on a woods-operation basis the best methods of logging virgin timber to insure adequate sugar pine regeneration. One of the hazards involved in so reducing the vegetative cover as to leave openings of suitable ecologic character for the regeneration of sugar pine from seed is the danger of brush encroachment on the relatively denuded and ecologically pioneer areas. Species of several vigorous genera of brush, notably Ribes, Ceanothus, and Arctostaphylos, may be classed as pioneer plants, and are greatly favored by forest openings that are essential to sugar pine regeneration. Viable seeds of these several brush genera appear to be "stored" in the duff and soil, even under mature forest, from previous ecologically pioneer conditions, and to be stimulated into growth by the disturbances incidental to logging. A reasonably accurate estimate of the kind and number of viable brush seeds in forest soil on any specific area should be of value in planning a logging operation such as that projected by the Forest Experiment Station.

The writer has had some experience in the recovery of viable ribes seeds from forest duff and soil [See SR (Serial Report) 100:12f; SR 101:30f; SR 125:8f, and SR 135:5f], and undertook the task of estimating roughly the kind and number of duff-stored seeds on two 40-acre areas, parts of which will be logged experimentally in 1948. In 1947 just before the first fall rains, some 66 duff-and-soil samples, each from an area of 2 square links (1/50 of a milacre) were collected from various representative ecologic niches on the two 40's mentioned above. Mr. F. A. Patty of the Regional BRC Office at Berkeley and the writer reduced the samples by sundry means to seed concentrates, and inspected and cultured the concentrates. Germination tests on the many cultures are not yet complete. The results of visual inspection of the seed concentrates prior to culturing, summarized in table 6, indicate that the brush "potential" on this and similar areas is considerable.

TABLE 1. SUMMARY OF DATA FROM RECENT INSPECTIONS OF ONE-ACRE RIBES REGENERATION PLOTS ON THE SIERRA N.F.

Plot name and Forest	Date of inspection	Estimated linear feet ribes live stem		Size distribution of mapped ribes bushes								Total mapped ribes bushes	Addi- tional known ribes seedlings	Fruiting ribes bushes	
		CSS	OLS	found**	0- 4"	5- 11"	1'- 2.9'	3- 5.9'	6- 11.9'	12- 24'	25' plus				
Shaver Timber Plot, Sierra N.F. (Erad. 1939 and 1945)	7/11/42(1)	5	15	20	10	4	9	--	--	--	--	23	263	--	--
	8/10/43	403	56	459	80	95	61	29	12	3	1	281	482	--	--
	8/5/44	NR*	NR*	1596	469	147	120	45	28	29	12	850	None	10	10
	8/20/45(r)	NR	NR	5723	389	149	196	99	59	43	61	996	None	45	45
	7/11/46(e)	NR	NR	NR	--	--	--	--	--	--	--	--	117	--	--
	6/25/47	36	9	45	80	21	7	1	--	--	--	109	360	--	--
Blue Canyon Plot, Sierra N.F. (Erad. 1940 and 1944)	8/4/44	18	66	84	39	22	27	2	1	--	--	91	None	--	--
	8/22/45(e)	0.4	1.3	1.7	2	2	--	--	--	--	--	4	None	--	--
	7/10/46	0.3	0.4	0.7	2	--	--	--	--	--	--	2	None	--	--
	6/27/47	0.3	0.3	0.6	10	--	--	--	--	--	--	10	None	--	--
Pilot Peak Plot, Sierra N.F. (Erad. 1937 and 1940)	8/12/40(e)	37	75	112	7	20	23	5	1	2	--	58	None	--	--
	7/15/41	43	88	131	13	17	25	11	1	1	--	68	16	--	--
	6/9/42	38	121	159	6	24	37	11	3	1	--	82	16	--	--
	8/9/43	90	147	237	5	20	30	22	7	2	--	86	2	1	1
	7/26/44	113	191	304	9	27	39	19	10	4	--	103	None	1	1
	7/5/45	115	239	354	7	27	40	26	6	7	--	113	3	3	3
	7/8/46	159	317	476	6	18	42	30	8	5	3	112	None	5	5
	6/23/47	208	489	697	5	20	37	30	14	6	5	117	None	5	5
Signal Peak Plot, Sierra N.F. (Erad. 1937, 1939, and 1944)	9/12/44(e)	65	125	190	8	16	32	12	4	3	--	75	None	NR	NR
	7/4/45	99	204	303	12	27	51	12	13	4	--	119	5	5	5
	7/7/46	121	263	384	7	13	50	25	16	13	4	128	4	7	7
	6/21/47	122	374	496	7	27	66	29	15	6	--	150	None	9	9

*NR = Not recorded, i.e., not separately recorded, or too late in season to record.

**CSS = Current season stem, OLS = older live stem, and TLS = total live stem.

(1) = First post-logging inspection.

(e) = First post-eradication inspection.

(r) = These bushes removed from plot.

TABLE 2. SUMMARY OF DATA FROM RECENT INSPECTIONS OF ONE-ACRE RIBES REGENERATION PLOTS ON THE PLUMAS N.F.

Plot name and Forest	Date of inspection	Estimated linear foot ribes live stems			Size distribution of mapped ribes bushes								Total mapped ribes bushes	Addi- tional known ribes seedlings	Fruiting ribes bushes
		CSS	found	TLS	ribes bushes										
					0- 4"	5- 11"	1'- 2.9'	3- 5.9'	6- 11.9'	12- 24'	25' plus				
Inter-road Plot, Plumas N.F. (Erad. 1940, 1942, 1946)	7/26/43(c)	31	62	93	5	9	9	4	2	2	--	31	6	1	
	9/1/44	39	75	114	7	11	9	3	3	1	1	35	None	1	
	7/17/45	38	106	144	7	7	9	7	5	1	1	37	None	2	
	8/20/46(c)	25	65	90	5	7	6	6	2	--	1	27	None	1	
	7/31/47	31	90	121	4	5	6	3	5	1	1	25	None	1	
Gentle Gully Plot, Plumas N.F. (Erad. 1940, 1942, 1946)	7/27/43(c)	113	185	298	15	58	41	17	8	--	1	140	182	1	
	9/2/44	284	323	607	12	88	89	23	16	4	2	234	136	2	
	7/19/45	350	581	931	1	46	98	54	31	9	3	242	130	8	
	8/21/46(c)	180	418	598	16	30	51	29	15	11	1	153	None	5	
	8/1/47(c)	106	255	361	17	36	48	19	14	5	--	139	12	4	
Rock Creek Plot, Plumas N.F. (Erad. 1939)	8/30/44	32	58	90	54	17	13	5	3	--	--	92	None	--	
	7/20/45	39	77	116	39	17	17	6	2	2	--	83	None	--	
	8/17/46	41	100	141	30	17	19	5	1	2	1	75	None	1	
	8/11/47	34	135	169	26	18	17	6	4	2	1	74	None	1	
Fanianni Plot, Plumas N.F. (Erad. 1940 and 1947)	7/22/43(1)	16	19	35	7	2	7	2	1	--	--	19	3	--	
	8/28/44	45	29	74	15	4	4	2	2	2	--	29	None	--	
	7/23/45	75	67	142	140	29	19	2	--	4	--	194	None	2	
	8/13/46	116	114	230	68	21	25	9	4	6	--	133	48	3	
	8/6/47(c)	432	276	708	43	43	32	19	11	8	7	168	None	5	

*NR Not recorded, i.e., not separately recorded, or too late in season to record.

(1) = First post-logging inspection.

(c) = First post-cratication inspection.

(r) = These bushes removed from plot.

TABLE 3. COW CREEK 10-ACRE (MC #5, CFES). RECORD OF KNOWN RIBES ON 10 SELECTED SQUARE-CHAIN SUBPLOTS ERADICATED IN 1941 AND 1947

Date of inspection **	Estimated Ribes live stem, linear foot			Size distribution of known ribes plants, estimated linear live stem										Total known ribes plants	Ribes, 1 foot or more of TLS	Distribution of total known live ribes, by estimated yrs. of origin									
	CSS	OLS	TLS	0-0.9"	1-1.9"	2-3.9"	4-5.9"	6-8.9"	9-11.9"	1.0-2.9"	3.0-5.9"	6.0-11.9"													
				0-0.9"	1-1.9"	2-3.9"	4-5.9"	6-8.9"	9-11.9"	1.0-2.9"	3.0-5.9"	6.0-11.9"													
7/1/42	0.4	--	0.4	50	-	-	-	-	-	-	-	-	50	0	-	-	-	-	-	-	-	-	-	-	
7/5/43	1.5	1.8	3.3	10	1	5	-	-	-	1	-	-	17	1	-	-	5	10	-	1	1	-	-	-	
6/30/44	5.5	4.5	10.0	66	11	10	3	1	-	2	-	-	93	2	-	-	73	9	4	3	2	1	1	-	
6/28/45	6.5	17.7	24.2	27	19	18	3	2	-	5	2	-	76	7	-	21	30	10	4	4	3	2	3	1	
6/20/46	14.7	27.2	41.9	11	9	24	5	7	-	8	4	-	68	12	5	12	26	5	6	5	3	2	3	1	
5/21/47	11.2	39.3	50.5	-	11	21	10	2	5	7	2	3	61	12	1	8	22	7	7	6	4	2	3	1	
7/19/47*	11.4	24.9	36.3	2	14	12	1	3	5	7	2	1	47	10	1	8	15	6	5	4	5	2	-	1	

*First inspection after removal of ribes from 10-acre plot by routine eradication crew.

**No known ribes of 1937 origin.

TABLE 4. COW CREEK 10-ACRE PLOT (MC #5, CFTS). RECORD OF KNOWN RIBES ON 10 SELECTED SQUARE-CHAIN SUBPLOTS
ERADICATED FIRST IN 1947.

Type of data	Dates of inspection							
	June 3, 1941	June 25, 1942	July 5, 1943	July 1, 1944	June 29, 1945	June 21, 1946	May 22, 1947	July 19, 1947*
Size distribution of known ribes, feet of linear live stem	0-1.9'	6	7	4	15	36	43	29
	2-5.9'	13	17	11	26	17	22	8
	6-15.9'	26	32	28	41	37	33	11
	16-40'	37	28	38	31	34	35	2
	41-100'	12	12	17	9	15	13	0
	101-500'	11	12	10	7	5	5	0
	501' plus	1	1	1	1	1	1	0
Total known ribes plants	106	109	109	110	130	145	152	50
Total estimated live stem, feet	4682	4893	4590	5011	3464	3869	3920	193
Mean size bush, feet of live stem	44.2	44.9	43.0	45.6	26.6	26.7	25.8	3.9
Visually estimated Vigor of live ribes, in percent of total	Excellent	0	5	1	3	1	1	0
	Good	3	21	11	13	17	12	4
	Fair	35	38	51	55	48	52	28
	Poor	56	28	31	16	32	24	44
	Very poor	2	7	6	7	3	11	24
Vigor: Good or excellent, percent	8	26	12	21	6	18	13	4
Ribes bushes fruiting	69	72	52	63	55	66	66	5
Percent fruiting ribes	65	66	48	62	42	46	43	10
Total estimated ribes fruits	---	3450	1530	2820	2145	4155	6235	55
Fruits per fruiting bush	---	117	29	26	39	63	95	11

*After plot had been worked by routine ribes-eradication crew.

TABLE 5. OCCURRENCE OF CURRENT-SEASON RIBES SEEDLINGS ON MILACRE PLOTS, 1944-47.

Series of milacre plots	Dates of inspection				No. of mil-acres in series	Number of current season seedlings observed			
	1944	1945	1946	1947		1944	1945	1946	1947
1938: Chowchilla Mt.	6/14	6/12	7/4	6/17	10	157	81	77	34
1939: Chowchilla Mt.	6/14	6/12	7/4	6/17	5	100	59	90	64
Plot E: " "	6/17	6/13	7/4	6/18	12	561	448	271	59
Plot F: " "	6/17	6/13	7/4	6/18	12	205	142	80	9
Markwood Meadow	8/3	5/23	7/11	6/26	10	16	18	8	29
Pine City Mt.	7/27	7/6	---	6/24	6	23	8	--	10
Cow Creek Campsite	6/21	6/15	6/7	5/24	10	202	153	28	4
Totals	1261	1150	1090	1170	65	1264	909	554	209
Means	6/29	6/13	7/1	6/16	9.3	*18.1	*14.0	*9.4	*3.2

*Mean current-season seedlings per milacre.

TABLE 6. GENERAL SUMMARY OF PRESUMABLY VIABLE SEEDS FOUND BY VISUAL INSPECTION OF 66 DUFF-AND-SOIL SAMPLES COLLECTED IN 1947, SERIES AT-DG

Items of data	Kinds of seeds				
	Manzanita(1)	Ceanothus(2)	Ribes(3)	Other species	All species
Total seeds observed	87	2884	66	715	3752
Mean seeds observed*	1.3	43.7	1.0	10.8	56.8
Most seeds observed in one sample*	38	406	12	292	411
Least seeds observed*	None	None	None	None	None
Samples with one or more seeds	14	54	21	45	62
Samples without seeds	52	12	45	21	4

*Per collection of 1/50 milacre (1/50,000 acre).

(1) Mostly Arctostaphylos patula.

(2) Mostly Ceanothus cordulatus and Ceanothus parvifolius; some Ceanothus integririmus.

(3) Mostly Ribes roezli; probably a few Ribes nevadense and Ribes cereum.

SECTION III. LABORATORY, GREENHOUSE, AND SPECIAL ACTIVITIES.

At Berkeley, principal laboratory and greenhouse activities were (1) testing of new herbicides on ribes that have been resistant to dilute 2,4-D formulations, (2) germination tests on ribes seed, especially the effects of 2,4-D on seed viability and the viability of seed extracted from soils of representative pine areas, (3) conferences with technicians of spray equipment industry with special reference to light weight sprayers for jeep or pickup truck and to methods and equipment for spraying 2,4-D by helicopter and by fixed wing aircraft. In furnishing new organic compounds for testing as herbicides, the Division of Insecticide Investigations (Dr. R. C. Roark) has been especially helpful. Of the many new formulations tested, salts and esters of hi-grade 2,4,5-trichlorophenoxyacetic acid were the only ones sufficiently promising to justify field tests in 1947. On greenhouse grown R. lacustre, R. viscosissimum, R. lobbii, and R. binominatum the ester of 2,4,5-T in kerosene, 1,000 ppm or more, has been 100% effective. Preliminary observations on field plots treated with 2,4,5-T are not conclusive, suggesting that field plants will be harder to kill than greenhouse plants. Further field tests on dilute and concentrated 2,4,5-T salts and esters and further studies on the seasonal effect of these 2,4,5-T compounds as influenced by the purity of the herbicide are now needed.

At Spokane, a study was made to determine the usefulness of soil analysis by rapid chemical tests in judging the potential ribes problem prior to reaching decisions relative to the most desirable cutting practice for a stand of timber. The conclusion reached was that soils do not provide a reliable index of ribes potentials, but along with fire history of an area, considerable importance can be attached to soil fertility as related to fire history and the potential problem of ribes. These results corroborate similar work undertaken at Berkeley on soil samples collected from typical sugar pine areas. Other incompleeted projects include (1) the improvement of techniques in preconditioning white pine seed for direct sowing, (2) germination of stored ribes seed recovered from undisturbed forest soils following logging and fire to determine period of longevity after a major forest disturbance, (3) propagation of ribes in the laboratory for preliminary chemical tests, (4) development of workable techniques for rooting white pine cuttings from supposedly rust resistant trees, and (5) correlation of weather data with years of varying pine infection.

During 1947 the following published papers or special reports dealing with the above-mentioned subjects were prepared by methods personnel:

- MS 7974 GERMINATION OF PHACELIA SEEDS. Madrono, Jan. 1947, IX:17-20.
.....C. R. Quick
- MS 8411 THE CONTROL OF WEED HOSTS OF PLANT DISEASES. Ninth Annual
Western States Weed Control Conference. pp. 18-21, Portland, Ore.
Feb. 6,7, 1947.H. R. Offord
- Serial No. 134
EFFECTS OF LOGGING OF VIRGIN TIMBER ON RIBES REGENERATION IN
THE CENTRAL SIERRA NEVADAC. R. Quick
- Serial No. 135
EXPERIMENTAL GERMINATION OF RIBES AND PINE SEEDS. SERIES OF 1945.
.....C. R. Quick
- Serial No. 136
GERMINATION TESTS ON SUGAR PINE SEED.C. R. Quick
- Serial No. 137
SOME EXPERIMENTAL ASPECTS OF RIBES SEED LONGEVITY.
.....C. R. Quick
- Serial No. 138
PRUNING WHITE PINE REPRODUCTION TO SALVAGE A STAND HEAVILY
INFECTED WITH WHITE PINE BLISTER RUST.
.....C. R. Stillinger
- Serial No. 139
BLISTER RUST DAMAGE TO POLE-SIZED WESTERN WHITE PINE ON THE
MIDDLE FORK OF THE ST. MARIES RIVER.R. T. Bingham
- Serial No. 140
PRELIMINARY REPORT ON THE AMES CREEK SMALL BUSH STUDY.
.....R. T. Bingham
- Serial No. 141
FACTORS RELATED TO THE EFFECTIVE USE OF 2,4-D FOR RIBES ERADICA-
TION.H. R. Offord

12 7
WHITE PINE BLISTER RUST CONTROL

IN THE 6

NORTHWESTERN REGION *for 1947*

January 1 to December 31, 1947

United States Department of Agriculture
Bureau of Entomology and Plant Quarantine
Division of Plant Disease Control
Blister Rust Control
618 Realty Building
Spokane, Washington



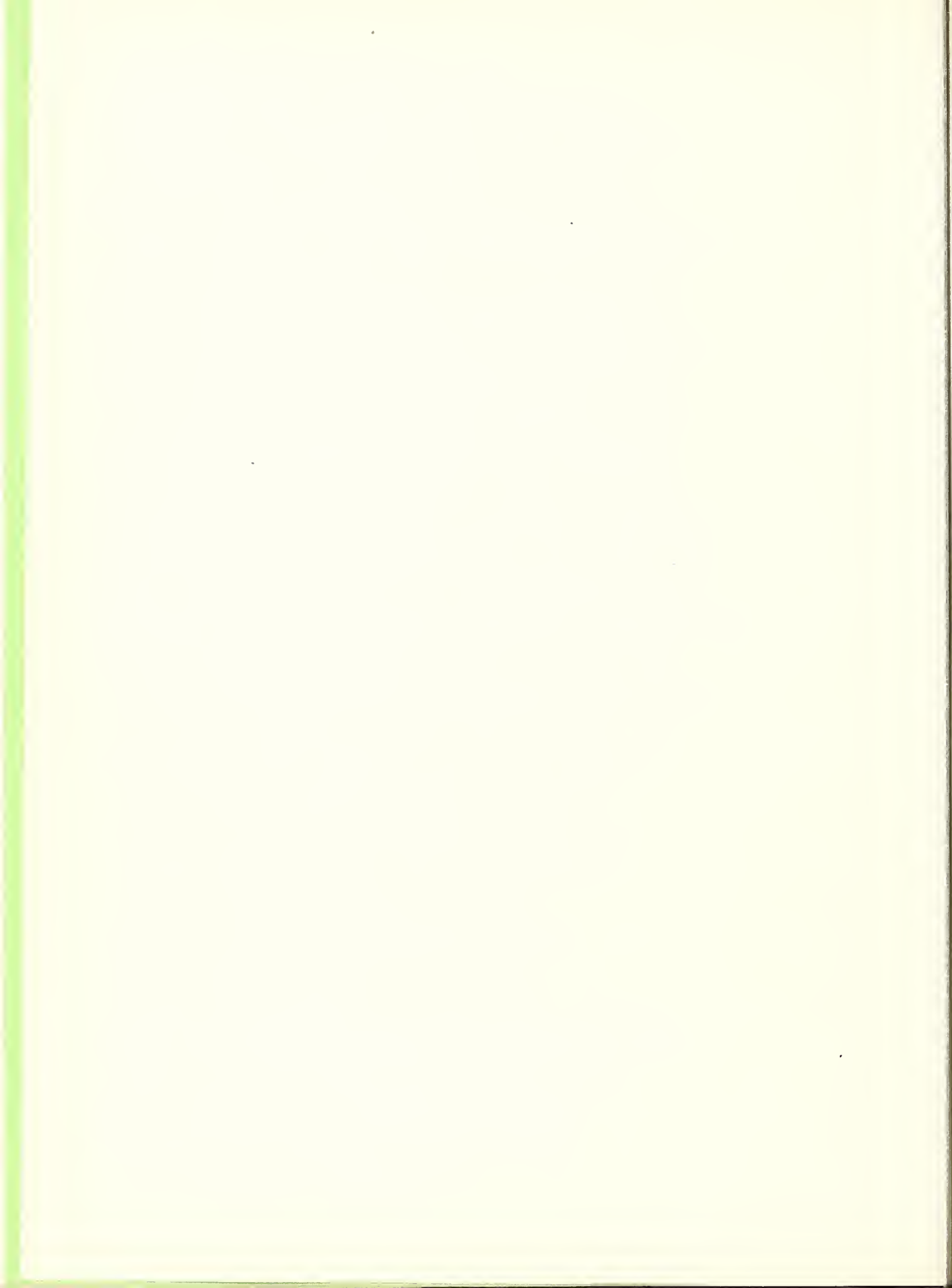
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WHITE PINE BLISTER RUST CONTROL IN THE NORTHWESTERN REGION

January 1 to December 31, 1947

Herman E. Swanson, Regional Leader

The Bureau of Entomology and Plant Quarantine, U. S. Forest Service, National Park Service, State of Idaho, and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations of North Idaho were directly engaged in the ribes eradication program in the Northwestern Region.

Four developments were of particular importance to blister rust control in the Northwestern region in 1947. (1) The drastic reduction in federal aid for control work on state and private lands was a severe setback to a balanced program in this region. Extreme fluctuations in funds disrupt plans and greatly increase costs. (2) The substantial programs retained on national forest and national park lands resulted in a great increase in the over-all accomplishments in the region. (3) The damage which blister rust is capable of inflicting on older tree age classes is becoming visible in pole sized timber. (4) Developments in chemical methods of ribes eradication are highly promising for great reductions in costs of control.

Progress in 1947. Reduction in fiscal year 1948 funds resulted in a drop from 64,490 effective man-days in calendar year 1946 to 58,712 man-days in 1947. This was due primarily to the 65 per cent reduction in federal aid for work on state, private and intermingled lands. Fifteen camps with well-organized and trained crews were prematurely closed in August with several weeks of good working weather remaining. Even with the reduction, progress in acreage worked went from 56,372 acres in 1946 to 81,241 in 1947, an increase of 44 per cent.

This improvement was the result of several factors. Labor conditions. An adequate supply of labor was available for the first time since 1941. Minimum age requirement was raised to 18 years. Efficient and stable crews resulted with far less turnover. Fire fighting. Less disruption and loss of time from project work occurred because of a light fire season. Training procedures. Training of blister rust workers was greatly improved through use of large sized training charts. Laborers became proficient in less time than formerly required as techniques of the job were more readily conveyed to the worker. Chemical eradication. Heavy ribes concentrations which formerly were man-day absorbing jobs were treated with the new herbicides. Not only was the man-day requirement substantially reduced but also the removal of these areas from tiresome hand pulling had a favorable effect on crew morale.

As a result of control work in 1947, 30,189 acres were placed on maintenance and 4,928 acres of previously protected area reverted to an unworked status as a result of logging disturbances.

Infection conditions. Damage from blister rust is appearing in many places in pole sized timber as a result of early infection occurring between 1923 and 1937. Damage studies were expanded in 1946 to measure the effect of the potential losses on stocking. Climatic conditions in the fall of 1947 and the heavy infection on ribes portend a year of heavy spread of infection to white pine.

In scouting for spread of the rust toward the pine areas of Wyoming and Colorado, blister rust infection was found on Ribes petiolare on Trail Creek near Victor, Idaho, in association with Pinus flexilis. The location is in Teton County, Idaho, on the Targhee National Forest. Although the rust was found about 10 miles east of this point in Wyoming in 1946, this new location is 150 miles south of rust locations previously reported in Idaho.

Chemical methods of ribes eradication. For want of a chemical sufficiently low in price and at the same time effective on all ribes species, chemical methods in practical control work have been restricted largely to use of either 2,4-D or Ammate in stream type. Considerable experimentation is being done in methods of spraying in upland types since it seems likely that a satisfactory chemical will soon be found. Results show that areas can be covered for one-half the cost of hand pulling methods. Also, if a satisfactory chemical is found it is expected that one or two workings will suffice where three or four workings are required by hand methods.

In 1947, four power sprayers mounted on $1\frac{1}{2}$ -ton trucks and ten portable power sprayers were used. Forty-one Hi-Fog guns, portable knapsack sprayers with a pressure cylinder operating with 350 lbs. to 1,000 lbs. pressure, were used. With the Hi-Fog gun an acre can be given complete coverage with one to three gallons of spray, and it is a valuable piece of equipment for hormone sprays. From the equipment standpoint the project is ready to launch a large ribes eradication project with chemicals where effective results may require either large or small volumes of solutions.

Contracting ribes eradication. A start was made in letting contracts for the eradication of ribes on small areas. Three contracts were let by the Forest Service and the results are presented in the Coeur d'Alene and Kaniksu reports. Experiments in this region and in California and Oregon show that excellent results can be achieved by this system at a much lower cost than in normal procedures.

SUMMARY OF PROGRESS

A summary of blister rust control activities in the Northwestern Region is presented in the following tables:

TABLE 1

SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1947

State	Operating Agency	First Working			Second Working			Other Workings			All Workings			Per Acre		Number of Camps	Total Seasonal Employees
		Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Acres	Ribes Destroyed	Man-Days	Ribes	Man-Days		
Idaho	BEPP	6,135	629,086	4,700	13,012	487,442	8,138	10,081	112,928	5,316	29,228	1,229,456	18,154	42	62	15	782
	FS	4,896	218,720	3,697	13,279	348,161	10,708	12,214	257,409	11,059	30,389	834,290	25,464	27	84	24	1,015
	Subtotal	11,031	847,806	8,397	26,291	835,603	18,846	22,295	380,337	16,375	59,617	2,063,746	43,618	55	73	39	1,797
Montana	FS	2,638	227,998	2,200	719	127,276	1,485	773	39,962	1,238	4,130	395,236	4,923	96	1,19	5	190
	NPS	738	111,150	860	687	63,295	902	408	58,426	398	1,833	232,861	2,160	127	1,18	3	67
	Subtotal	3,376	339,148	3,060	1,406	190,561	2,387	1,181	98,388	1,636	5,963	628,097	7,083	105	1,19	8	257
Washington	FS	3,053	255,351	1,522	2,463	84,489	1,273	3,134	42,365	1,239	8,650	382,205	4,034	44	47	2	97
	NPS	3,053	255,351	1,522	2,463	84,489	1,273	2,134	28,136	805	2,134	28,136	805	13	58	1	24
	Subtotal	6,106	510,702	3,044	4,926	168,978	2,546	5,268	70,501	2,044	10,784	410,341	4,839	58	45	3	121
Wyoming	BEPP	6,135	629,086	4,700	13,012	487,442	8,138	10,081	112,928	5,316	29,228	1,229,456	18,154	42	62	15	782
	FS	10,587	702,069	7,419	16,461	559,926	13,466	16,121	349,736	13,536	43,169	1,611,731	34,421	37	80	31	1,302
	Subtotal	16,722	1,331,155	12,119	29,473	1,047,368	21,604	26,202	462,664	18,852	72,397	2,841,187	52,575	79	69	46	2,084
All States	BEPP	6,135	629,086	4,700	13,012	487,442	8,138	10,081	112,928	5,316	29,228	1,229,456	18,154	42	62	15	782
	FS	10,587	702,069	7,419	16,461	559,926	13,466	16,121	349,736	13,536	43,169	1,611,731	34,421	37	80	31	1,302
	Subtotal	16,722	1,331,155	12,119	29,473	1,047,368	21,604	26,202	462,664	18,852	72,397	2,841,187	52,575	79	69	46	2,084
Total	BEPP	6,135	629,086	4,700	13,012	487,442	8,138	10,081	112,928	5,316	29,228	1,229,456	18,154	42	62	15	782
	FS	10,587	702,069	7,419	16,461	559,926	13,466	16,121	349,736	13,536	43,169	1,611,731	34,421	37	80	31	1,302
	Subtotal	16,722	1,331,155	12,119	29,473	1,047,368	21,604	26,202	462,664	18,852	72,397	2,841,187	52,575	79	69	46	2,084

TABLE 2

ACREAGE WORKED BY LAND OWNERSHIP - 1947

Land Ownership	First Working		Second Working		Other Workings		All Workings
	Acres	Acres	Acres	Acres	Acres	Acres	
National Forest Region 1	13,417	18,642	15,676	47,735			
National Park	5,615	687	2,542	8,844			
Public Domain		245	630	875			
State and Private	3,305	10,586	9,896	23,787			
Total	22,337	30,160	28,744	81,241			

TABLE 3

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1947

State	Cooperatives Funds		Total Federal Funds	Total All Funds	Federal Funds				Cooperative Funds			Expenditures Ribes Eradication
	Total (Direct and Indirect Aid)	Direct Aid			Entomology and Plant Quarantine		Forest Service	Park Service	Direct Aid			
					3101	3103			State	Private	Total	
Idaho	\$32,937.35	\$30,937.35	\$1,121,544.33	\$1,154,481.68	\$82,741.49	\$111,230.00	\$583,200.83		\$15,028.11	\$15,909.24	\$30,937.35	\$1,064,280.00
Mont.	1,000.00		209,745.73	210,745.73	17,211.68	(1)344,322.01	141,590.53	\$50,943.52				192,503.00
Wash.	1,000.00		129,896.39	130,896.39	17,001.23		97,020.00	15,875.16				108,006.00
Colo.	200.00		1,241.56	1,441.56	500.00			741.56				
Wyo.	200.00		65,222.91	65,422.91	3,973.07			61,249.84				61,250.00
Total	\$35,337.35	\$30,937.35	\$1,527,650.92	\$1,562,988.27	\$121,427.47	\$455,602.01	\$821,811.36	\$128,610.08	\$15,028.11	\$15,909.24	\$30,937.35	\$1,425,839.00

(1) Intermingled lands.

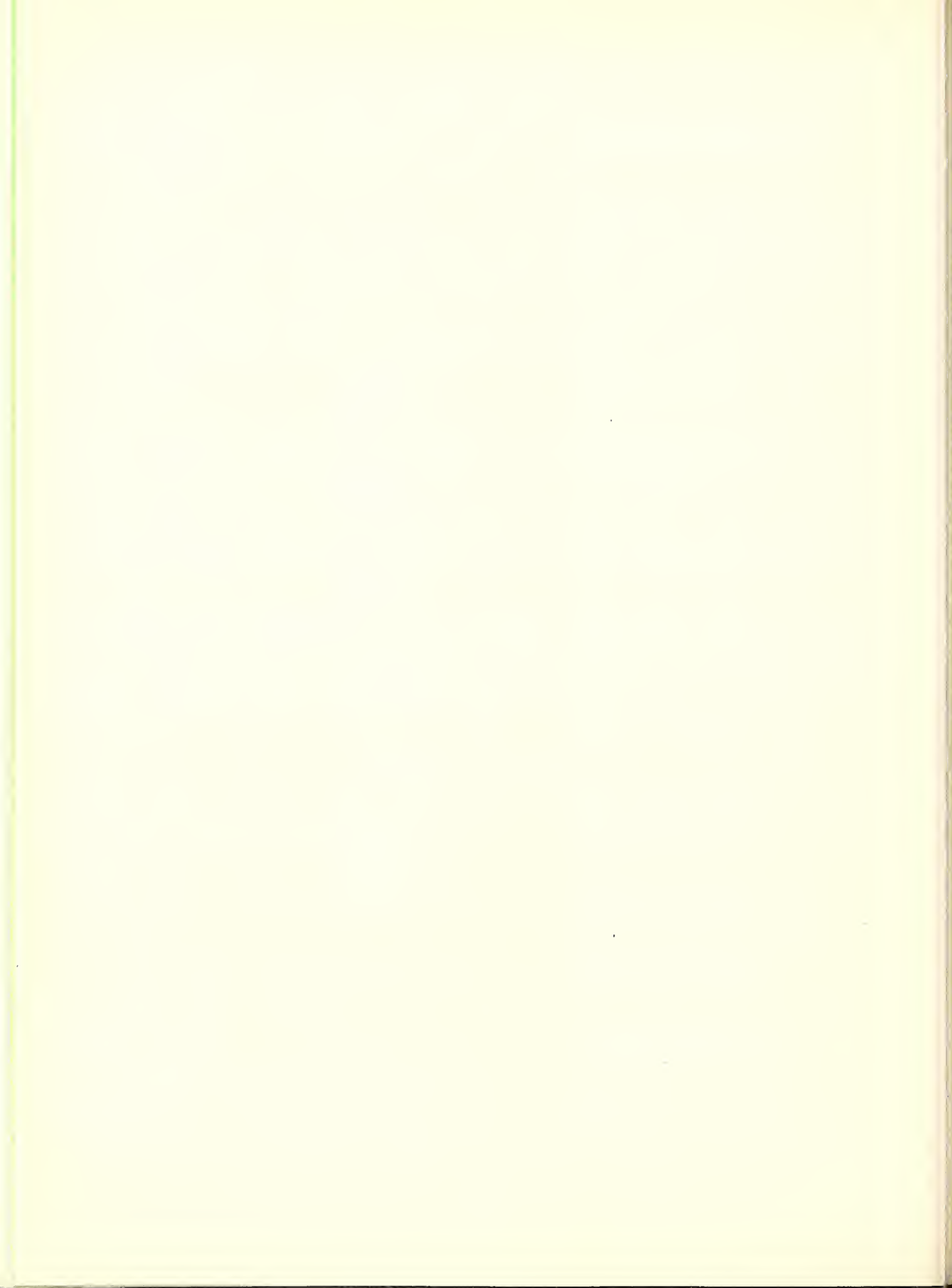


TABLE A

STATUS OF RIBES ERADICATION BY STATES - ALL OWNERSHIPS, DECEMBER 31, 1947
Accumulative Series - Net

State	Total Acres		First Working		Second Working		Other Workings		On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P. & Prot. Zone)	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
Idaho	1,931,507	2,254,664	1,512,912	67	410,408	120,776	439,488	22	741,752	1,023,424		
Montana	204,411	212,781	141,747	67	15,811	6,724	77,203	36	71,034	64,544		
Washington	140,697	152,964	116,258	76	44,489	23,488	38,194	25	36,706	78,064		
Subtotal	2,226,615	2,620,409	1,770,917	68	470,709	150,988	604,885	23	949,492	1,166,032		
Wyoming*	230,778	230,778	23,651	12	152	13,350	6	202,127	15,301			
Colorado*	206,000	206,000	14,859	7	1,952	8,000	4	191,141	6,859			
Subtotal	436,778	436,778	43,510	10	2,114	21,350	5	393,268	22,160			
Total	2,663,393	3,057,187	1,814,427	59	472,822	150,988	626,235	20	1,242,760	1,188,192		

TABLE B

SUMMARY OF STATUS OF RIBES ERADICATION BY LAND OWNERSHIP, DECEMBER 31, 1947
Accumulative Series - Net

Land Ownership	Total Acres		First Working		Second Working		Other Workings		On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P. & Prot. Zone)	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Acres	Per Cent	Unworked Acres	Requiring Rework Acres
National Forests R-1	1,195,209	1,403,219	1,064,024	76	274,215	75,525	353,930	25	339,195	710,094		
National Forests R-2 & 4	*421,000	421,000	36,619	9	1,962	17,000	4	384,381	19,619			
Subtotal	1,616,209	1,824,219	1,100,643	60	276,177	75,525	370,930	20	723,576	729,713		
National Parks	24,087	24,087	14,851	62	6,581	9,700	10,000	42	9,236	4,851		
Public Domain	21,289	29,409	16,727	57	6,235	2,360	5,509	19	12,682	11,218		
Subtotal - Interior	45,376	53,496	31,578	59	12,816	12,060	15,509	29	21,918	16,069		
Total - Federal	1,661,585	1,877,715	1,132,221	60	288,993	87,585	386,439	21	745,494	745,782		
State and Private Lands	1,001,808	1,179,472	682,206	58	193,829	63,403	239,796	20	497,266	442,410		
Total	2,663,393	3,057,187	1,814,427	59	472,822	150,988	626,235	20	1,242,760	1,188,192		

* Indefinite

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Calendar Year 1947

Herman E. Swanson, Regional Leader

Cooperative blister rust control on state and private lands in Idaho in 1947 was conducted by the Bureau of Entomology and Plant Quarantine in cooperation with the State of Idaho, and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations. Ninety-five per cent of the state and private lands in the control area of the Northwestern Region lies in North Idaho. State and private lands in Montana and Washington are relatively small and scattered. Some of these are protected incidentally with the protection of federal lands.

The drastic reduction of 65 per cent in the amount of federal allotments in the fiscal year 1948 for work on state, private, and intermingled lands was a severe setback to this program. The full effects of the reduction will not be apparent until the 1948 season work. The cooperative program that is now possible under the funds from federal, state and private sources is but 13 per cent of the annual requirement over the next five years to complete protection on 300,000 acres of top priority white pine.

The camps and workers on the cooperative field project were distributed as follows:

<u>Operation</u>	<u>Number Camps</u>	<u>Number Workers</u>
Clearwater	5	240
St. Joe (Potlatch)	5	257
Kaniksu (Priest Lake)	<u>5</u>	<u>285</u>
Total	15	782

On the Kaniksu and St. Joe operations a large part of the work was performed in sapling and pole sized stands. As a consequence, a considerable portion of the area worked was placed on a maintenance basis, approximately 17,000 acres. Work in the Clearwater territory is largely on cutover lands on which an average of three workings will be required.

A full description of the cooperative work will be found in the Clearwater, St. Joe and Kaniksu reports. A summary of the cooperative program in 1947 follows:

1. Allotments

	<u>Fiscal Year 1947</u>	<u>Fiscal Year 1948</u>
Federal		
State and Private Lands	\$337,711.00	\$125,000.00
Intermingled Lands	320,000.00	
State of Idaho	15,000.00	20,000.00
Clearwater T.P.A.	6,422.40	6,502.78
Potlatch T.P.A.	5,420.30	5,420.30
Priest Lake T.P.A.	<u>4,066.54</u>	<u>4,055.00</u>
Total	\$688,620.24	\$160,978.08

2. Expenditures - Calendar Year 1947

<u>Operation</u>	<u>State and Private</u>	<u>Federal</u>	<u>Total</u>
Clearwater	\$13,564.76	\$143,612.56	\$157,177.32
St. Joe (Potlatch)	9,818.04	151,809.90	161,627.94
Kaniksu (Priest Lake)	<u>7,554.55</u>	<u>160,179.55</u>	<u>167,734.10</u>
Total	\$30,937.35*	\$455,602.01	\$486,539.36

*1947 - State \$15,028.11, Private \$15,909.24

1928-1947 - State \$223,470.78, Private \$183,252.39

3. Cooperative Ribes Eradication in Idaho, 1947

<u>Operation</u>	<u>Acres Worked</u>			<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Initial</u>	<u>Rework</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Clearwater	1,923	5,311	7,234	5,958	555,298	.82	77
St. Joe	20	9,429	9,449	6,347	110,387	.67	12
Kaniksu	<u>4,192</u>	<u>8,353</u>	<u>12,545</u>	<u>5,849</u>	<u>563,771</u>	<u>.47</u>	<u>45</u>
Total	6,135	23,093	29,228	18,154	1,229,456	.62	42

4. State and Private Lands Worked in 1947

<u>State</u>	<u>Acres Worked</u>			
	<u>First</u>	<u>Second</u>	<u>Third</u>	<u>Total</u>
Idaho	3,142	10,076	9,612	22,830
Montana	3	216	174	393
Washington	<u>160</u>	<u>294</u>	<u>110</u>	<u>564</u>
Total	3,305	10,586	9,896	23,787

5. Progress on State and Private Land, 1923-1946 (Net Acres)

<u>State</u>	<u>Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres in Control Area</u>
	<u>First</u>	<u>Second</u>	<u>Third</u>			
Idaho	639,052	169,510	56,598	214,100	477,243	1,116,295
Montana	19,732	2,591	2,014	13,821	15,025	34,757
Washington	<u>23,422</u>	<u>11,728</u>	<u>4,791</u>	<u>11,875</u>	<u>4,998</u>	<u>28,420</u>
Total	682,206	183,829	63,403	239,796	497,266	1,179,472

BLISTER RUST CONTROL ON NATIONAL FORESTS IN REGION ONE

Calendar Year 1947

Herman E. Swanson, Regional Leader

Blister rust control in 1947 was conducted by the Forest Service on six national forests. The Bureau of Entomology and Plant Quarantine assisted in the work as in previous years.

Control work on national forest lands is presented in reports for each of the national forests. The following report briefly summarizes the work.

While project allotments were somewhat smaller for the 1947 program resulting in a drop in effective man-days from 38,269 in 1946 to 34,421 in 1947, acreage covered increased from 25,657 acres in 1946 to 43,169 in 1947, an increase of 68 per cent. Several developments contributed to this fine showing. A better class of labor and a light fire season were important factors. Interruptions for fire fighting were not serious and most camp crews worked a comparatively full season.

Logging practices and subsequent stand improvement work on national forest lands in recent years have left the blister rust control forces with fewer high cost and difficult ribes eradication jobs. In the past, heavy ribes eradication on logged areas was taking too high a portion of the control effort.

New chemicals and spraying equipment were employed to good advantage. The Forest Service secured 31 Hi-Fog guns, a back pack sprayer operating at high pressures, for applying 2,4-D. Later in the season, portable power sprayers for applying 2,4-D or Ammate were secured. Four large power spray rigs mounted on $1\frac{1}{2}$ -ton trucks were made available to the Forest Service by the Bureau of Entomology and Plant Quarantine. For want of a chemical effective on all ribes species in upland sites, chemical eradication has had relatively small use. In handling the difficult and heavy concentrations of ribes this limited use has done a great deal to lower average costs.

The following tabulations summarize the expenditures and accomplishments in blister rust control by the Forest Service and present the net progress on national forest lands:

1. Expenditures by Forest Service, 1947

Clearwater	\$126,138.88
St. Joe	216,530.01
Coeur d'Alene	139,647.30
Kaniksu	197,904.64
Cabinet	58,888.00
Kootenai	<u>82,702.53</u>
Total	\$821,811.36

2. Expenditures by Forest Service, 1930-1947

<u>Forest</u>	<u>Regular</u>	<u>Emergency</u>	<u>Total</u>
Clearwater	\$1,171,601.55	\$ 413,454.80	\$1,585,056.35
St. Joe	2,283,103.66	383,340.06	2,666,443.72
Coeur d'Alene	1,274,764.75	669,809.81	1,944,574.56
Kaniksu	1,287,299.50	458,055.36	1,745,354.86
Cabinet	505,437.26	258,476.52	763,913.78
Kootenai	<u>293,835.95</u>	<u>28,233.00</u>	<u>322,068.95</u>
Total	\$6,816,042.67	\$2,211,369.55	\$9,027,412.22

3. Ribes Eradication by Forest Service Crews, 1947

<u>Forest</u>	<u>Acres Worked</u>			<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Initial</u>	<u>Rework</u>	<u>Total</u>			<u>Man-Days</u>	<u>Ribes</u>
Clearwater	2,644	3,672	6,316	5,232	258,854	.83	41
St. Joe	95	10,600	10,695	10,050	167,367	.94	16
Coeur d'Alene	909	5,206	6,115	5,890	246,301	.96	40
Kaniksu	4,301	11,612	15,913	8,326	543,973	.52	34
Cabinet	78	1,123	1,201	2,443	178,618	2.03	149
Kootenai	<u>2,560</u>	<u>369</u>	<u>2,929</u>	<u>2,480</u>	<u>216,618</u>	<u>.85</u>	<u>74</u>
Total	10,587	32,582	43,169	34,421	1,611,731	.80	37

4. Ribes Eradication on National Forest Lands, 1923-1947

<u>Forest</u>	<u>Net Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres</u>
	<u>First</u>	<u>Second</u>	<u>Third</u>			
Clearwater	154,101	53,682	10,258	39,420	46,251	114,681
St. Joe	215,281	82,449	32,525	73,064	96,927	142,217
Coeur d'Alene*	307,979	53,150	14,350	95,735	53,067	212,244
Kaniksu	269,067	74,606	14,737	84,979	87,290	184,088
Cabinet	63,051	8,102	3,500	29,734	10,975	33,317
Kootenai	<u>54,545</u>	<u>2,226</u>	<u>155</u>	<u>30,998</u>	<u>44,685</u>	<u>23,547</u>
Total	1,064,024	274,215	75,525	353,930	339,195	710,094

*Includes 310 acres first working and 80 acres unworked on Mount Spokane operation.

BLISTER RUST CONTROL ON NATIONAL PARKS

Calendar Year 1947

Herman E. Swanson, Regional Leader

FOREWORD

Blister rust control in the Northwest conducted by the National Park Service in cooperation with the Bureau of Entomology and Plant Quarantine is described in separate reports for Mount Rainier, Glacier, and Yellowstone. The following report briefly summarizes the work on these national parks.

The 1947 program showed very good progress. Work on Mount Rainier has progressed to where the end of large-scale operations is in sight. This will come in 1948 or 1949 depending upon the size of the 1948 program. Work on Glacier is progressing well and previous estimates for the complete program appear adequate. In Yellowstone, some of the most difficult work on the Mount Washburn area is completed. Work on the Craig Pass area was started and completed in 1947. Little rework will be required on the unit because ribes were confined to only a small part of the area.

Chemical eradication. Developments in chemical eradication methods have been of particular value to the control program in the northwest. The age and size of ribes and the rough topography in which they grow, which prevails in the national parks, make hand pulling of ribes very difficult and in many cases impossible without the aid of chemicals. Herbicides, ammonium sulfamate and 2,4-D, have permitted a wider use of chemical methods both as sprays and as dry or wet applications to crowns of decapitated ribes. While most of the initial work has been completed, chemicals will greatly facilitate future work on the difficult locations where rework is necessary, and control areas should reach a maintenance status in a much shorter time.

Rocky Mountain National Park. A survey was conducted on the Longs Peak-Estes Cone area in Rocky Mountain National Park to secure information on which to base recommendations for a possible control area. Maps are being prepared showing pine and ribes distribution on the 5,128 acres surveyed together with estimates on the cost of protecting various units of this area. Prior to starting control work, the effectiveness of approved herbicides should be tested on the several ribes species. Accordingly, for 1948 it is recommended that a series of chemical tests be made, the results of which will have an important bearing on plans for future control work.

Spread of blister rust. In 1946 a significant spread of the rust was revealed by the discovery of infection on Ribes petiolare on Trail Creek east of Teton Pass in Teton County, Wyoming. In 1947, infection was found on the same species on Trail Creek near Victor in Teton County, Idaho. This is 10 miles west of the 1946 location. The accompanying map shows the known spread of blister rust.

Expenditures and progress. The following tabulations summarize the expenditures and progress of work on national parks in the Northwestern Region:

1. Expenditures by the National Park Service

<u>National Park</u>	<u>Calendar Year 1947</u>	<u>All Years</u>
Mount Rainier	\$ 15,875.16	\$ 96,549.42
Glacier	50,943.52	74,566.96
Yellowstone	61,249.84	77,800.10
Rocky Mountain	<u>741.56</u>	<u>741.56</u>
Total	\$128,810.08	\$249,658.04

2. Ribes Eradication on National Parks in 1947

<u>National Park</u>	<u>Acres Worked</u>				<u>Per Acre</u>			
	<u>First</u>	<u>Second</u>	<u>Other</u>	<u>Total</u>	<u>Man-Days</u>	<u>Ribes</u>	<u>Man-Days</u>	<u>Ribes</u>
Mount Rainier			2,134	2,134	805	28,136	.38	13
Glacier	738	687	408	1,833	2,160	232,861	1.18	127
Yellowstone	<u>4,877</u>	<u> </u>	<u> </u>	<u>4,877</u>	<u>3,172</u>	<u>382,917</u>	<u>.65</u>	<u>79</u>
Total	5,615	687	2,542	8,844	6,137	643,914	.69	73

3. Gross Acreage Worked on National Parks, 1930-1947

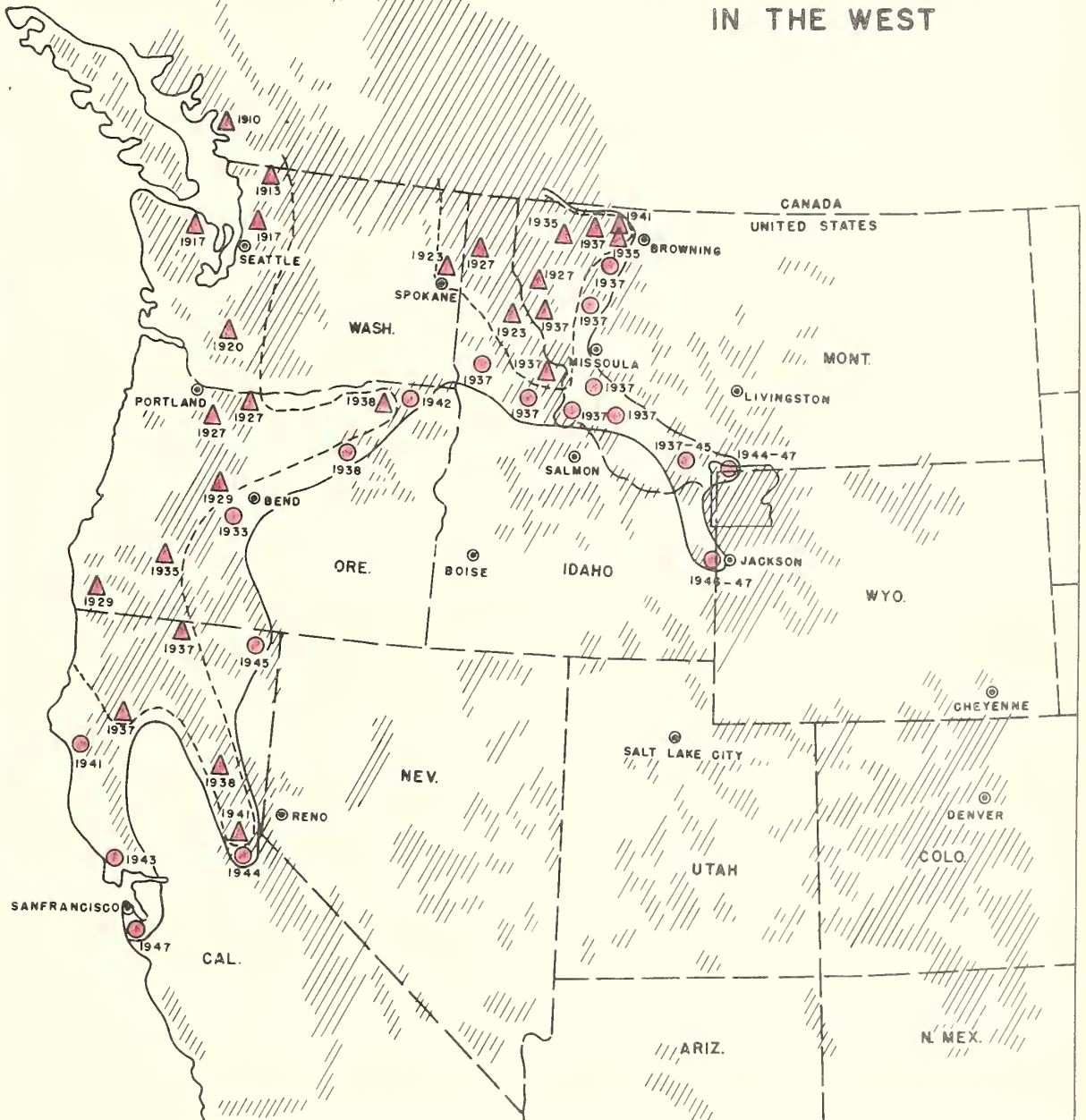
<u>National Park</u>	<u>Acres Worked</u>				<u>Per Acre</u>			
	<u>First</u>	<u>Second</u>	<u>Other</u>	<u>Total</u>	<u>Man-Days</u>	<u>Ribes</u>	<u>Man-Days</u>	<u>Ribes</u>
Mount Rainier	8,254	4,327	8,865	21,446	22,856	2,270,755	1.07	106
Glacier	4,379	2,889	1,055	8,323	8,993	973,586	1.08	117
Yellowstone	<u>6,891</u>	<u>152</u>	<u> </u>	<u>7,043</u>	<u>4,932</u>	<u>572,886</u>	<u>.70</u>	<u>81</u>
Total	19,524	7,368	9,920	36,812	36,781	3,817,227	1.00	104

4. Work Status in Net Control Area

<u>National Park</u>	<u>Acres Worked</u>			<u>Acres on Maintenance</u>	<u>Acres Unworked</u>	<u>Total Acres Control Area</u>
	<u>First</u>	<u>Second</u>	<u>Other</u>			
Mount Rainier	3,581	3,540	8,645	3,000		3,581
Glacier	4,379	2,889	1,055	2,650	349	4,728
Yellowstone	6,891	152		4,350	1,887	8,778*
Rocky Mountain	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u>7,000</u>	<u>7,000*</u>
Total	14,851	6,581	9,700	10,000	9,236	24,087

*Indefinite

SPREAD OF BLISTER RUST IN THE WEST



LEGEND

- ▲ (1910) PINE INFECTION AND YEAR OF ORIGIN
- (1947) RIBES INFECTION AND YEAR FOUND
- BOUNDARY OF INFECTION ON PINE
- BOUNDARY OF INFECTION ON RIBES
- //// WHITE PINE
- STATE LINES



BLISTER RUST CONTROL, INLAND EMPIRE, 1947

By

Frank O. Walters
Assistant Regional Leader

Organization

The Inland Empire portion of the Northwestern Region includes northern Idaho, western Montana, and northeastern Washington, and supports the commercially important belt of western white pine.

This section is divided into five separate divisions or operations, as follows: 1. Clearwater; 2. St. Joe; 3. Coeur d'Alene; 4. Kaniksu, and 5. Montana. Each operation represents an administrative unit of lands similar in character.

The Bureau of Entomology and Plant Quarantine provides technical leadership for the control work on all land and administers all work on state and private lands. The Forest Service is responsible for administration of the work on national forest lands.

Labor Situation

The labor situation was the best since 1941. College men were available as well as a greater number of older experienced men. The general attitude was more sincere and turnover was less. More experienced supervisory personnel were on the job although the supply of men of camp superintendent caliber was limited. More competent cooks were available, resulting in fewer difficulties in operating the kitchens.

Accomplishments

During the current season more acreage was covered and a higher quality work performed than at any time since 1940 (see fig. 1). With the exception of one operation, less than one man-day per acre was expended (see fig. 2).

Had it been possible to maintain the program scheduled for state and private lands throughout the season without the drastic reduction caused by reduced allotments, greater accomplishments would have been made with materially lower costs.

Under existing circumstances we are committed to a policy of retrenchment; hence it is advisable to place areas on which work has been undertaken on a maintenance basis as soon as possible. Consequently most of the work was a follow-up on areas needing additional protection.

The Bureau camps on the St. Joe were able to place sizable areas of advance reproduction and pole on maintenance in the Purdue, Moose Meadows, Butterfield and Round Meadows areas. The Forest Service crews worked in pole and reproduction stands in the vicinity of Clarkia and in plantations near Emida, Idaho. A large block of pole in the east fork of Charlie Creek was placed on maintenance.

On the Clearwater unit the Bureau camps worked on reproducing cutover lands in the vicinity of Pierce and Headquarters, Idaho. The Forest Service camps worked plantations and pole stands in the Beaver Creek drainage and cutover lands in the Musselshell district. Advance reproduction and pole stands were worked in the Moose City area.

Kaniksu Bureau camps rounded out a large block of pole and reproduction northeast of upper Priest Lake, most of the area going on maintenance. It was also possible to place most of the pole areas worked in Pack River and Grouse Creek in a maintenance classification. The Forest Service camps did eradication work in cutover areas in the lower west branch drainage, Dubius Creek, and the Gleason Meadow area. Stream type work was performed on Granite Creek above Nordman and on Priest River near the Priest River Experiment Station. A large block of pole in Bear Paw Creek and another on the Muddy Fork near Ione, Washington, was worked to maintenance standards.

The Coeur d'Alene crews worked in the extensive plantation areas in Jordan Creek and the West Elk drainage. A good cleanup was accomplished and portions of the older plantations placed on maintenance. Work was also performed in the pole and cutover areas in the North Fork drainage.

On the Kootenai Forest, work was concentrated in the Yaak River drainage where a heavy stream type program was carried on along the river and on Burnt Creek. Only a small amount of work remains to be done to place the pole areas worked this season in the Cyclone and Red Top drainages on a maintenance basis. The Cabinet Forest carried on work in reproduction stands in Big Creek and Rainy Creek.

Eradication Methods

With a better class of labor it was possible to use more three-man crews as independent units and depend less on the gang-type of crew.

One and two-man units were used in an effort to reduce the work time on areas with few ribs. Promising results were obtained and their use will be extended next year. Flanking crews were used to good advantage in making the final cleanup on pole and advance reproduction areas.

Contracts for the eradication of ribs on specified areas were let by the Forest Service on the Coeur d'Alene and Kaniksu operations. The weather was so unfavorable during the period of the contract that it was impossible for the contractors to earn a normal wage. A material savings to the Government resulted and the system holds sufficient promise to warrant further trials under more favorable circumstances.

Chemical Methods

Power equipment was used on four operations to apply ammonium sulfamate to stream type ribs of all species. Results were generally favorable and definite savings resulted. The Clearwater operation applied 2,4-D to upland cutover areas with power units, and used the Hi-Fog gun back pack unit for extensive stream type cleanup of Ribes petiolare.

PRODUCTION BY YEARS - ALL CLASSES OF CAMPS

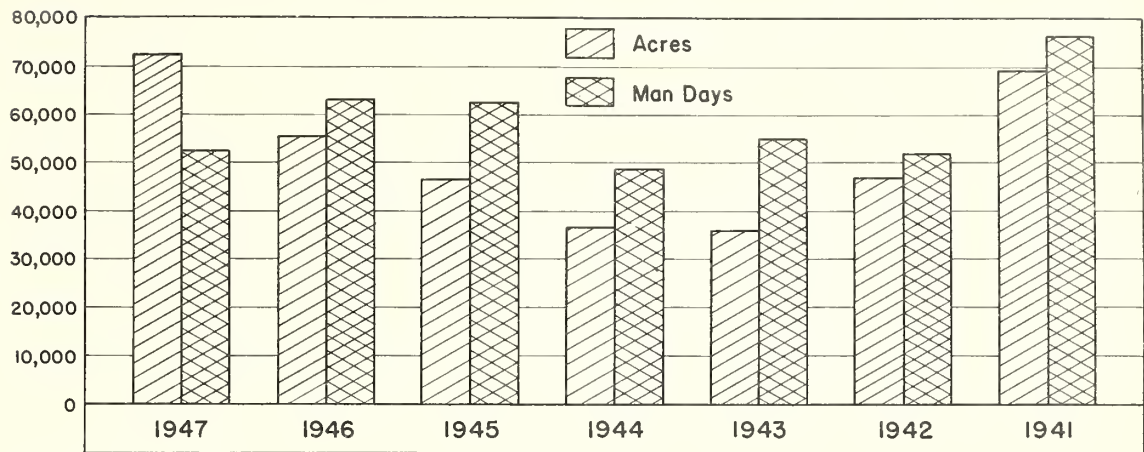


Fig. 1

PRODUCTION BY OPERATIONS 1947

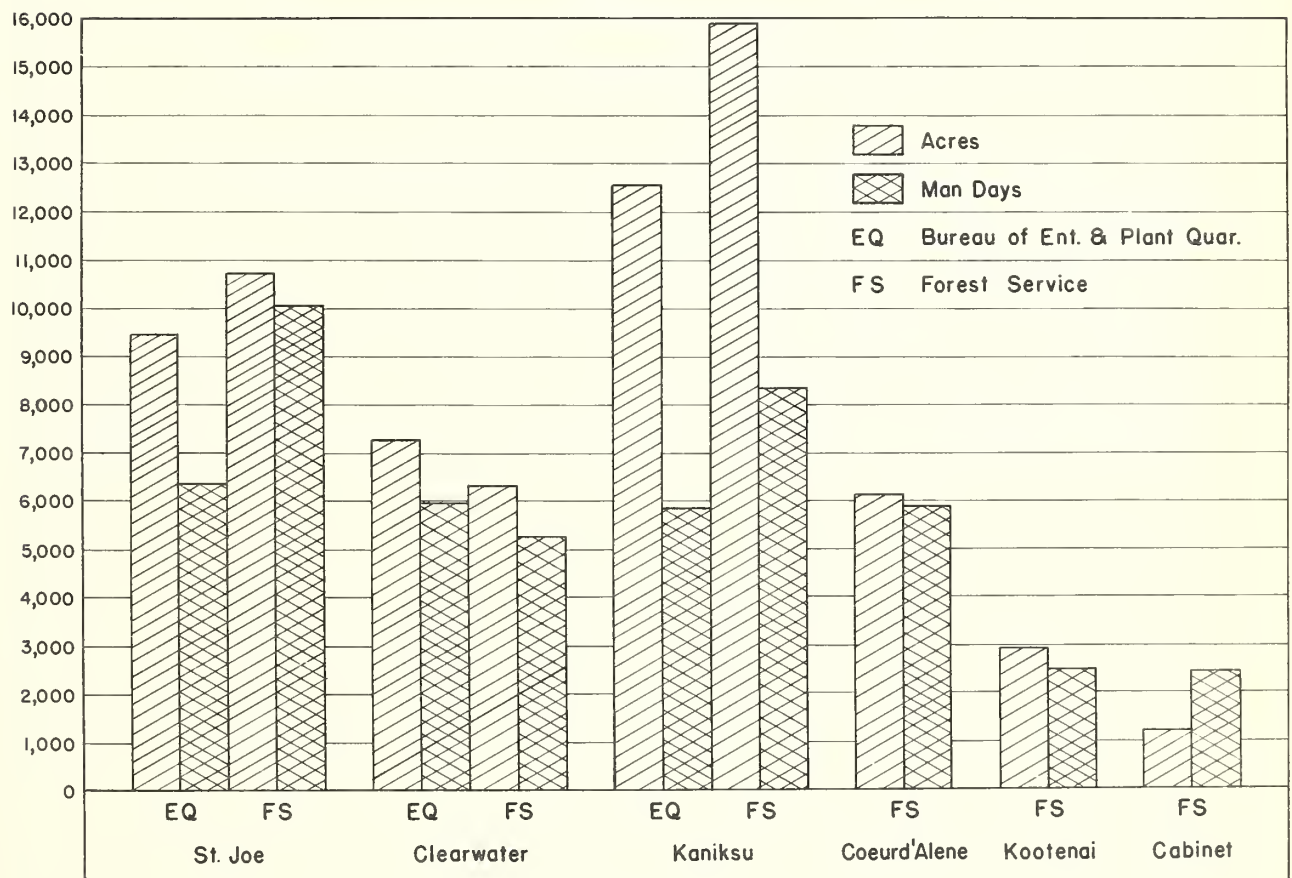


Fig. 2



After the active field season the permanent Bureau personnel tested equipment and worked on the development of methods for applying spray to upland areas with power units.

Training

The ribes eradication training charts used for the first time during the current season proved of great value in giving the workers a better understanding of the whole job and the importance of their responsibilities. Methods of procedure in carrying out their assignments were more quickly assimilated. It was possible to give the workers a more complete understanding of the disease cycle and the importance of control. With this understanding of all phases of the work and a knowledge of the disease, follow-up training was easier.

Status of the Disease

The full effect of the 1941 wave is now apparent over the entire white pine belt. Little subsequent infection has been noted except in areas of numerous ribes. The current season had all the indications of a bad wave year and areas not fully protected can be expected to suffer.

The statement of expenditures and costs is shown in the following tables by the cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS IN INLAND EMPIRE, 1947

Cooperating Agency	Appropriation	Amount
Bureau of Entomology & Plant Quarantine	Regular BLR-1-4	\$ 47,353.62
	Regular BLR-3-4	455,602.01
	Subtotal	\$ 502,955.63
State of Idaho Timber Protective Associations	State BLR-3-4	15,028.11
	Private BLR-3-4	15,909.24
	Subtotal	\$ 30,937.35
Forest Service	Regular BLR-4	\$ 821,811.36
Total		\$1,355,704.34

TABLE 2

CLASSIFIED EXPENDITURES IN INLAND EMPIRE, 1947

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Cont. ribes erad.					\$ 1,567.64	\$ 1,567.64
Sal. perm. men	\$44,916.99	\$ 30,419.52		\$ 75,336.51	54,781.48	130,117.99
Sal. temp. men		47,770.88	\$ 5,254.79	53,025.67	77,695.26	130,720.93
Wages, temp. labs.		147,015.26	25,682.56	172,697.82	445,358.23	618,056.05
Subs. supplies		92,913.07		92,913.07	151,719.26	244,632.33
Equipment		31,795.71		31,795.71	31,238.08	63,033.79
Trucks		44,268.18		44,268.18		44,268.18
Travel & transp.	1,499.58	16,132.89		17,632.47	23,844.44	41,476.91
Other supplies	937.05	45,286.50		46,223.55	35,606.97	81,830.52
Total	\$47,353.62	\$455,602.01	\$30,937.35	\$533,892.98	\$821,811.36	\$1,355,704.34

TABLE 3
SUMMARY OF RIBES ERADICATION, 1947
INLAND EMPIRE

Working	Eradication Types	Year of Origin	Acres	Man-Days	Ribbs	Per Acre Man-Days	Ribbs
First	Plantation	1945-49	148	488	28,307	3.30	191
	Cutover	1945-49	743	673	86,819	.91	117
	Cutover (5)	1940-44	1,929	1,200	327,759	.62	170
	Cutover	1920-39	1,585	1,407	100,484	.89	63
	Reproduction	1910-39	2,041	1,700	78,135	.83	38
	Pole		9,243	4,719	436,670	.51	47
	Mature		202	201	25,067	1.00	124
	Miscellaneous		90	106	3,121	1.18	35
	Stream (1)		741	1,625	244,793	2.19	330
	Total		16,722	12,119	1,331,155	.72	80
Second	Plantation	1945-49	53	155	18,411	2.92	347
	Plantation	1940-44	55	144	1,640	2.62	30
	Cutover	1940-44	440	545	53,763	1.24	122
	Cutover	1920-39	1,509	1,675	50,952	1.11	34
	Reproduction	1910-39	11,664	10,305	287,919	.88	25
	Pole		12,659	4,874	314,720	.39	25
	Mature		328	115	2,259	.35	7
	Miscellaneous		321	147	3,753	.46	12
	Stream (2)		2,444	3,644	313,951	1.49	128
	Total		29,473	21,604	1,047,368	.73	36
Third	Plantation	1940-44	2,058	1,119	18,903	.54	9
	Cutover	1920-39	7,954	4,217	97,318	.53	12
	Reproduction	1910-39	8,268	8,122	169,090	.98	20
	Pole		5,915	3,400	62,478	.57	11
	Mature		341	80	4,779	.23	14
	Miscellaneous		90	99	1,324	1.10	15
	Stream (3)		1,576	1,815	108,772	1.15	69
All Workings	Total		26,202	18,852	462,664	.72	18
	Plantation	1945-49	201	643	46,718	3.20	232
	Cutover	1945-49	743	673	86,819	.91	117
	Plantation	1940-44	2,113	1,263	20,543	.60	10
	Cutover (6)	1940-44	2,369	1,745	381,522	.74	161
	Cutover	1920-39	11,048	7,299	248,754	.66	23
	Reproduction	1910-39	21,973	20,127	535,144	.92	24
	Pole		27,817	12,993	813,868	.47	29
	Mature		871	396	32,105	.45	37
	Miscellaneous		501	352	8,198	.70	16
	Stream (4)		4,761	7,084	667,516	1.49	140
	Total		72,397	52,575	2,841,187	.73	39

Chemical work included above:

Stream				Upland			
Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray	
(1) 304	652	15,183		(5) 61	102	14,700	
(2) 295	579	9,120		(6) 61	102	14,700	
(3) 644	701	6,855					
(4) 1,243	1,932	31,158					

TABLE 4
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
INLAND EMPIRE

State	Working	Class	Acres	Man-Days	Ribbs	Gallons Spray	Per Acre Man-Days	Ribbs
Idaho	First	Eq-Coop.	6,135	4,700	629,086	17,727	.77	103
		FS-Reg.	4,896	3,697	219,720	1,968	.76	45
		Total	11,031	8,397	847,806	19,695	.76	77
	Second	Eq-Coop.	13,012	8,138	487,442		.63	37
		FS-Reg.	13,279	10,708	348,161	2,790	.91	28
		Total	26,291	18,846	835,603	2,780	.72	32
	Third	Eq-Coop.	10,081	5,316	112,928	177	.53	11
		FS-Reg.	12,214	11,059	267,409	6,235	.91	22
		Total	22,295	16,375	380,337	6,412	.73	17
	All Workings	Eq-Coop.	29,228	18,154	1,229,456	17,904	.62	42
		FS-Reg.	30,389	25,464	834,290	10,983	.84	27
		Total	59,617	43,618	2,063,746	28,887	.73	35
Montana	First	FS-Reg.	2,638	2,200	227,998	8,313	.83	86
	Second	FS-Reg.	719	1,485	127,276	6,340	2.07	177
	Third	FS-Reg.	773	1,238	39,962	443	1.60	52
	All Workings	FS-Reg.	4,130	4,923	395,236	15,096	1.19	96
	First	FS-Reg.	3,053	1,522	255,351	1,875	.50	84
Washington	Second	FS-Reg.	2,463	1,273	84,489		.52	34
	Third	FS-Reg.	3,134	1,239	42,365		.40	14
	All Workings	FS-Reg.	8,650	4,034	382,205	1,875	.47	44
	First	Eq-Coop.	6,135	4,700	629,086	17,727	.77	103
Total	First	FS-Reg.	10,587	7,419	702,069	12,156	.70	66
		Total	16,722	12,119	1,331,155	29,883	.72	80
	Second	Eq-Coop.	13,012	8,138	487,442		.63	37
		FS-Reg.	16,461	13,466	559,926	9,120	.82	34
		Total	29,473	21,604	1,047,368	9,120	.73	36
	Third	Eq-Coop.	10,081	5,316	112,928	177	.53	11
		FS-Reg.	16,121	13,536	349,736	6,678	.84	22
		Total	26,202	18,852	462,664	6,855	.72	18
	All Workings	Eq-Coop.	29,228	18,154	1,229,456	17,904	.62	42
		FS-Reg.	43,169	34,421	1,611,731	27,954	.80	37
		Total	72,397	52,575	2,841,187	45,858	.73	39



TABLE 5
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
INLAND EMPIRE

State		Working	Acres Worked															
			By Forest Service				By Bureau of Entomology and Plant Quarantine				Total							
			National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	Total	State	Private	Total
Idaho	First	4,883			13	4,896	3,006		1,598	1,531	6,135	7,889		7,889	1,598	1,544	3,142	11,031
	Second	10,783	242	1,338	916	13,279	5,190		3,546	4,276	13,012	15,973	242	16,215	4,884	5,192	10,076	26,291
	Third	9,736	510	259	1,709	12,214	2,317	120	1,175	6,469	10,081	12,053	630	12,683	1,434	8,178	9,612	22,295
	Total	25,402	752	1,597	2,633	30,389	10,513	120	6,319	12,276	29,228	35,915	872	36,787	7,916	14,914	22,830	59,617
Montana	First	2,635			3	2,638						2,635		2,635		3	3	2,638
	Second	500	3		216	719						500	3	503		216	216	719
	Third	599			174	773						599		599		174	174	773
	Total	3,734	3		393	4,130						3,734	3	3,737		393	393	4,130
Washington	First	2,893			160	3,053						2,893		2,893		160	160	3,053
	Second	2,169		80	214	2,463						2,169		2,169	80	214	294	2,463
	Third	3,024			110	3,134						3,024		3,024		110	110	3,134
	Total	8,086		80	484	8,650						8,086		8,086	80	484	564	8,650
Total	First	10,411			176	10,587	3,006		1,598	1,531	6,135	13,417		13,417	1,598	1,707	3,305	16,722
	Second	13,452	245	1,418	1,346	16,461	5,190		3,546	4,276	13,012	18,642	245	18,887	4,964	5,622	10,586	29,473
	Third	13,359	510	259	1,993	16,121	2,317	120	1,175	6,469	10,081	15,676	630	16,306	1,434	8,462	9,896	26,202
	Total	37,222	755	1,677	3,515	43,169	10,513	120	6,319	12,276	29,228	47,735	875	48,610	7,996	15,791	23,787	72,397

TABLE 6
RIBES SPECIES ERADICATED, 1947
INLAND EMPIRE

Working	Eradication Type	Acres	Ribes Species						Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Ribes triste	
First	Plantation (1945-49)	148	14,616	13,579	112				28,307
	Cutover (1945-49)	743	54,786	32,033					86,819
	Cutover (1940-44)	1,929	25,225	201,623	872	39			327,759
	Cutover (1920-39)	1,585	39,735	57,909	2,840				100,484
	Reproduction (1910-39)	2,041	59,201	11,548	1,062	5,807	517		78,135
	Pole	9,243	369,787	62,149	861	3,796	87		436,670
	Mature	202	19,697	5,370					25,067
	Miscellaneous	90	1,402	1,719					3,121
	Stream	741	153,912	9,705	27,990	38,043	11,343	3,800	244,793
	All Types	15,722	738,361	495,635	33,737	47,675	11,947	3,800	1,331,155
Second	Plantation (1945-49)	53	554	17,850	7				18,411
	Plantation (1940-44)	55	1,617	23					1,640
	Cutover (1940-44)	440	4,643	48,978	142				53,763
	Cutover (1920-39)	1,509	21,573	28,564	815				50,952
	Reproduction (1910-39)	11,664	208,767	70,810	2,763	5,579			287,919
	Pole	12,659	233,451	78,276	28	2,965			314,720
	Mature	328	2,247	12					2,259
	Miscellaneous	321	2,263	1,155		335			3,753
	Stream	2,444	225,345	7,525	38,537	29,551	153	12,840	313,951
	All Types	29,473	700,460	253,193	42,292	38,430	153	12,840	1,047,368
Third	Plantation (1940-44)	2,058	8,810	10,093					18,903
	Cutover (1920-39)	7,954	54,475	41,080	1,763				97,318
	Reproduction (1910-39)	8,268	107,626	60,169	66	1,030		199	169,090
	Pole	5,915	39,379	22,853	678	568			62,478
	Mature	341	4,163	616					4,779
	Miscellaneous	90	1,088	236					1,324
	Stream	1,576	59,484	9,283	37,909	1,098		1,008	108,772
	All Types	26,202	274,025	144,330	40,416	2,686		1,207	462,664
	Plantation (1945-49)	201	15,170	31,429	119				46,718
	Cutover (1945-49)	743	54,786	32,033					86,819
All Workings	Plantation (1940-44)	2,113	10,427	10,116					20,543
	Cutover (1940-44)	2,369	29,868	350,601	1,014	39			381,522
	Cutover (1920-39)	11,048	115,783	127,553	5,418				248,754
	Reproduction (1910-39)	21,973	375,594	142,527	3,891	12,416	517	199	535,144
	Pole	27,817	641,617	163,278	1,567	7,319	87		813,868
	Mature	871	26,107	5,998					32,105
	Miscellaneous	501	4,753	3,110					8,198
	Stream	4,761	438,741	26,513	104,436	68,682	11,496	17,648	667,516
	All Types	72,397	1,712,846	893,158	116,445	88,791	12,100	17,847	2,841,187



TABLE 7

SUMMARY OF RIBES ERADICATION, 1923-1947
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	1,137	1,033	44,914	.91	40	1,137	473
	Cutover	1945-49	743	673	86,819	.91	117	743	17,722
	Burn	1940-44	926	535	100,985	.58	109	926	246
	Plantation	1940-44	5,892	8,232	2,183,197	1.40	371	5,892	227
	Cutover (5)	1940-44	11,484	13,217	5,332,287	1.15	464	11,484	116,007
	Cutover	1920-39	85,664	83,438	24,778,188	.97	289	81,267	241,705
	Reproduction	1910-39	604,409	679,146	183,015,087	1.12	303	593,741	163,020
	Pole		373,134	160,053	28,439,912	.43	76	368,485	85,211
	Mature		708,607	298,853	63,278,180	.42	89	540,616	191,085
	Miscellaneous		36,909	32,485	8,409,040	.88	228	34,204	9,700
	Stream (1)		125,199	315,139	64,884,214	2.52	518	124,219	23,747
	All Types		1,954,347	1,593,352	380,664,573	.82	195	1,762,957	849,143
Second	Plantation	1945-49	53	155	18,411	2.92	347	53	
	Plantation	1940-44	4,507	4,365	254,463	.97	56	4,507	
	Cutover	1940-44	872	818	65,078	.94	75	872	
	Cutover	1920-39	55,656	62,009	13,200,700	1.11	237	55,656	
	Reproduction	1910-39	196,837	234,971	22,384,996	1.19	114	195,120	
	Pole		104,204	56,251	4,878,827	.54	47	103,477	
	Mature		43,624	27,767	2,974,606	.64	68	39,654	
	Miscellaneous		4,767	5,445	886,462	1.14	186	4,767	
	Stream (2)		60,564	93,397	12,413,121	1.54	205	60,173	
	All Types		471,084	485,178	57,076,664	1.03	121	464,279	
Third	Plantation	1940-44	3,024	2,373	83,815	.78	28	3,024	
	Cutover	1920-39	31,825	32,632	1,988,841	1.03	62	31,825	
	Reproduction	1910-39	65,308	89,406	3,525,405	1.37	54	64,701	
	Pole		17,023	10,490	501,541	.62	29	17,023	
	Mature		3,421	2,568	276,997	.75	81	3,421	
	Miscellaneous		1,066	566	32,152	.53	30	1,066	
	Stream (3)		20,228	29,856	2,655,144	1.48	131	20,228	
	All Types		141,895	167,891	9,063,895	1.18	64	141,288	
Total	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	1,190	1,188	63,325	1.00	53	1,190	
	Cutover	1945-49	743	673	86,819	.91	117	743	
	Burn	1940-44	926	535	100,985	.58	109	926	
	Plantation	1940-44	13,423	14,970	2,521,475	1.12	188	13,423	
	Cutover (6)	1940-44	12,356	14,035	5,397,365	1.14	437	12,356	
	Cutover	1920-39	173,145	178,079	39,967,729	1.03	231	168,748	
	Reproduction	1910-39	866,554	1,003,523	208,925,488	1.16	241	853,562	
	Pole		494,361	226,794	33,820,280	.46	68	488,985	
	Mature		755,652	329,188	66,529,783	.44	88	583,691	
	Miscellaneous		42,742	38,496	9,327,654	.90	218	40,037	
	Stream (4)		205,991	438,392	79,952,479	2.13	388	204,620	
	All Types		2,567,326	2,246,421	446,805,132	.88	174	2,368,524	

Chemical work included above:

Stream				Upland			
Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray	
(1) 23,468	55,560	1,538,839		(5) 61	102	14,700	
(2) 9,613	13,870	252,435		(6) 61	102	14,700	
(3) 4,298	5,426	58,992					
(4) 37,379	74,856	1,850,266					



TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1947
INLAND EMPIRE

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	48,984	20,468	5,042,300	79,864	.42	103
	EQ-Coop.	269,937	162,895	24,099,103	222,923	.60	89
	EQ-Emerg.	514,942	404,100	96,874,569	213,935	.78	188
	FS-Reg.	460,198	495,655	84,152,326	474,188	1.08	183
	FS-Emerg.	337,869	216,240	56,636,775	125,491	.64	168
	CCC	590,414	661,693	123,729,240	657,303	1.12	210
	Total	2,222,344	1,961,051	390,534,313	1,773,704	.88	176
Montana	EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
	EQ-Emerg.	66,076	30,787	5,775,415	1,330	.47	87
	FS-Reg.	41,922	51,616	4,578,794	25,299	1.23	109
	FS-Emerg.	35,712	35,620	7,367,723	21,638	1.00	206
	CCC	14,475	12,440	1,472,009	6,325	.86	102
	Total	160,187	133,758	19,955,651	89,387	.84	125
	EQ-Emerg.	64,757	63,140	17,825,782		.98	275
Washington	FS-Reg.	61,344	49,381	10,988,893	1,875	.80	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
	Total	184,795	151,612	36,315,168	1,875	.82	197
Total	EQ-Reg.	50,986	23,763	5,804,010	114,659	.47	114
	EQ-Coop.	269,937	162,895	24,099,103	222,923	.60	89
	EQ-Emerg.	645,775	498,027	120,475,766	215,265	.77	187
	FS-Reg.	563,464	596,652	99,720,013	501,362	1.06	177
	FS-Emerg.	409,947	266,246	68,017,758	147,129	.65	166
	CCC	627,217	698,838	128,688,482	663,628	1.11	205
	Total	2,567,326	2,246,421	446,805,132	1,864,966	.88	174

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1947
INLAND EMPIRE

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	857,488	234,726	61,818	1,154,032	251,827	1,109,315
	Public Domain	16,372	6,172	2,360	24,904	12,682	29,054
	Subtotal Federal	873,860	240,898	64,178	1,178,936	264,509	1,138,369
	State	229,574	63,005	20,145	312,724	118,653	348,227
	Private	409,478	106,505	36,453	552,436	358,590	768,068
	Subtotal Other	639,052	169,510	56,598	865,160	477,243	1,116,295
	Total	1,512,912	410,408	120,776	2,044,096	741,752	2,254,664
Montana	National Forest	117,596	10,328	3,655	131,579	55,660	173,256
	Public Domain	40	3		43		40
	Subtotal Federal	117,636	10,331	3,655	131,622	55,660	173,296
	State	734	1		735	173	907
	Private	18,998	2,590	2,014	23,602	14,852	33,850
	Subtotal Other	19,732	2,591	2,014	24,337	15,025	34,757
	Total	137,368	12,922	5,669	155,959	70,685	208,053
Washington	National Forest	88,940	29,161	10,052	128,153	31,708	120,648
	Public Domain	315	60		375		315
	Subtotal Federal	89,255	29,221	10,052	128,528	31,708	120,963
	State	6,832	4,015	2,114	12,961	988	7,820
	Private	16,590	7,713	2,677	26,980	4,010	20,600
	Subtotal Other	23,422	11,728	4,791	39,941	4,998	28,420
	Total	112,677	40,949	14,843	168,469	36,706	149,583
Total	National Forest	1,064,024	274,215	75,525	1,413,764	339,195	1,403,219
	Public Domain	16,727	6,235	2,360	25,322	12,682	29,409
	Subtotal Federal	1,080,751	280,450	77,885	1,439,086	351,877	1,432,628
	State	237,140	67,021	22,259	326,420	119,814	356,954
	Private	445,066	116,808	41,144	603,018	377,452	822,518
	Subtotal Other	682,206	183,829	63,403	929,438	497,266	1,179,472
	Total	1,762,957	464,279	141,288	2,368,524	849,143	2,612,100



BLISTER RUST CONTROL WORK, CLEARWATER OPERATION, 1947

By

M. C. Riley, Operation Supervisor

H. J. Faulkner, Assistant Operation Supervisor

B. C. Amsbaugh, Forest Officer

INTRODUCTION

The 1947 blister rust control program on the Clearwater operation included five camps operated by the Bureau of Entomology and Plant Quarantine and five camps by the Forest Service. In view of the small program, the work was located as strategically as possible within the 488,000 acre control area.

The workers were slightly older than those employed in the past few years and were a better class of labor. Efforts were made to combat labor turnover by providing additional recreational facilities in camps, intercamp competition and recreational trips. Most of the turnover was among workers from south Idaho and the local towns while the most stable group of workers came from the middle west.

Accomplishments on ribes eradication were cut short by a loss of considerable time because of rainy weather and by an early closing of Bureau camps caused by a reduction in funds.

ORGANIZATION AND ADMINISTRATION

Working agreements with cooperating agencies and the organization of field activities followed the same lines as in previous years. Blister rust control field organization for the 1947 field season was as follows:

Bureau of Entomology and Plant Quarantine

U. S. Forest Service

M. C. Riley, Operation Supervisor

B. C. Amsbaugh, Forest Officer

H. J. Faulkner, Assistant Operation Supervisor

Ray Van Deusen, Unit Supervisor

N. O. Glenisky, Checker Foreman

G. A. Meyer, Unit Supervisor

<u>Program</u>	<u>Number Camps</u>	<u>Number Workers</u>	<u>Number Checkers</u>
EQ-Cooperative	5	240	5
FS-Regular	<u>5</u>	<u>195</u>	<u>3</u>
Total	10	435	8

Thirty Mexican Nationals were secured in July for work in Forest Service camps. They were used on specially selected areas in conjunction with regular employees where there were sufficient high caliber workers for supervision and mop-up work. The Mexicans were available later in the season than other employees.

The first camp was established on May 19 and the last camp was occupied on June 15. The Bureau camps were all closed by August 15, while the Mexicans worked until September 26.

LOCATION AND DESCRIPTION OF AREAS

Cooperative Camps on State and Private Land

Camp 120, Hildebrand, located in T. 36 N., R. 5 E., sec. 16. This camp was near the state highway on Hildebrand Creek $2\frac{1}{2}$ miles from Pierce, Idaho. First working was performed on 1,224 acres of land cut over in 1937 and second working was done on 294 acres of a 1939 plantation and its protection zone. First working had been delayed on the 1937 cutting area until it was certain that sufficient white pine stocking was present to warrant cost of control.

There was a wide variation in the number of ribes removed from the area, ranging from ten to several hundred, and averaging fifty per acre. Ribes viscosissimum was the predominating species. In addition, 25 acres of stream type on Flat Creek were sprayed with chemicals for the destruction of R. lacustre and R. petiolare. Ammate was applied on most of this area with power equipment. The Mist Makers, applying 2,4-D, were used on side streams where only R. petiolare occurred. Additional work will be necessary where numerous ribes were removed this year and where suppressed bushes and new seedlings occurred. On the areas of lighter ribes population the only future work will be in stream type.

Camp 121, Rhodes Creek, located in T. 36 N., R. 5 E., sec. 1. The area extends down stream from the national forest boundary on both Rhodes Creek and Orofino Creek. First and second workings were involved on areas logged from 1940 to 1944. There were 254 acres of advance pole worked for the third time on the east side of Orofino Creek below the mouth of Rhodes Creek. Numerous ribes were present in the cutover type with R. viscosissimum predominating. Although good work was secured, additional workings will be necessary because the areas have not become stabilized and new seedlings are present. Twelve bushes per acre were removed from the pole type and the check shows an average of one bush with two feet of live stem remaining. No additional work should be necessary in this type except along the main stream. This is the second year this camp has been occupied and it should be used again next season to complete work on Orofino Creek and Mutton Gulch.

Camp 122, Jaype, located at the old Jaype railhead in T. 37 N., R. 5 E., sec. 21. This camp is centrally situated in a large block of white pine and by transporting crews the entire Quartz, Trail, Three Mile, McCauley, and part of the Orofino Creek drainages can be worked from this location. During 1947 second and third workings were performed on areas cut over between 1928 and 1936 on Quartz, Trail, and upper McCauley drainages. First working was performed on 1940 to 1944 cutover area in the north half of sec. 3, T. 36 N., R. 5 E., on main Orofino Creek. Of the 2,609 acres worked by this camp 247 were first working, 48 were second working, and 2,314 were third working. The first working on Orofino Creek supported a heavy ribes population and future workings will be necessary to protect the area. The third working generally supported few ribes. There were 850 acres, averaging less than 10 ribes per acre, which were worked at the rate of 4 acres per man-day using a special crew in open formation. With the exception of some troublesome spots that support small, suppressed ribes in a dense cover of vegetation, this area should require little additional work for permanent protection.

Camp 123, Reeds Creek, located in T. 38 N., R. 5 E., sec. 26, on the main Headquarters highway one-quarter mile south of the Timber Protective Association headquarters. First working was performed on 98 acres, second working on 455 acres, and third working on 897 acres. Heavy ribes populations, averaging from several hundred to thousands per acre, have appeared following logging operations on the Reeds Creek drainage. Several successive workings have been necessary with hand eradication methods to protect these areas and considerable damage to stocking has resulted from blister rust infection. With the recent developments in chemical methods it is hoped that areas logged in the future in this drainage may be protected more economically and successfully. On the new cutting worked for the first time this year there was an average of 340 ribes per acre with portions having over 1,000 per acre. Second working on area cut over in 1941 showed 60 ribes per acre. Third working on area logged prior to 1940 found 17 ribes per acre. Additional coverage will be necessary on areas worked for the first and second times this year. Checking results show that some additional work will also be necessary on portions of the third working area. Due to density of the vegetation many ribes are suppressed and remain so small that crews do not locate them all.

Camp 124, Bush Creek, located in T. 39 N., R. 6 E., sec. 33, in the upper portion of the Scofield Burn. Second working was performed on upland types and chemical eradication in stream type was conducted on Scofield Creek. First working on the Scofield Burn, which comprises 4,500 acres, was done during the years 1934 to 1937. Due to a reduction in the program, second working was delayed until 1944. Ribes petiolare had become re-established in fairly heavy concentrations and numerous ribes were present in the upland by 1941, which was a very favorable year for spread of the rust. As a result severe damage to the stocking of the stand has occurred. Work in 1947 completed the mop-up of stream type and blocked in second working on approximately one-half of the best part of the area. The size of future programs and an evaluation of the damage will determine what future work will be done on the area.

Forest Service Camps on Federal Lands

Camp 181, Musselshell Creek, located in T. 35 N., R. 6 E., sec. 30. Work was performed on the Deer Creek plantation, the cutover land adjacent to it, and on a portion of the area in Gold Creek. The Deer Creek plantation of 48 acres was slashed in the spring and control-burned in the fall of 1946 and planted in the spring of 1947. The cutover area still contains a considerable amount of pole-size white pine. The light working conditions encountered in this type were largely the result of the shade furnished by the pole timber remaining. The work in Gold Creek was in pole type. It is planned to complete work in this drainage in 1948 and very little additional work should be required for adequate protection.

Broadcast power spraying using Ammate was done on a portion of the stream type on Musselshell Creek. It appeared that good results were obtained. If an examination in the spring of 1948 confirms this observation, the balance of stream type will be sprayed in 1948.

Camp 182, Beaver Creek, located in T. 39 N., R. 5 E., sec. 14. This crew worked on the Beaver and Alder Creek plantations and adjacent areas. Rework was conducted on the 1940 Alder Creek plantation and initial work was performed on the

area planted in 1947 in the Alder Creek drainage. In the Beaver Creek drainage, rework was conducted on areas planted in 1937 and 1938 and where fill-in plantings were made in 1947. These plantations now contain very few ribes and little further work should be required to insure protection. Rework was performed in pole and reproduction stands surrounding the plantations. It is planned to continue work in Alder and Beaver Creek drainages until all work areas in the unit are in such condition to insure protection of the existing stands.

Camp 183, Moose Creek, located in T. 40 N., R. 11 E., sec. 32. Initial work and rework were conducted in pole and reproduction stands in the Moose Creek and Independence Creek drainages. Pine infection is heavier here than on a majority of the areas worked this season. It is felt that work is fully justified due to heavy stocking of white pine on the area at the present time and the presence of seedlings appearing throughout the stand in favorable openings. It is possible that some growing time may be lost in establishing a fully-stocked stand but protection of the area is warranted.

Camp 184, Deadwood Creek, located in T. 40 N., R. 11 E., sec. 31. This crew performed initial work in pole and reproduction stands on Deadwood and Moose Creek drainages. The area included some white pine acreage which had heretofore not been included in the control area but was worked to give additional protection strip. The age and density of the stands are such that little additional work is planned to afford adequate protection.

Camp 185, Sheep Mountain Creek, located in T. 40 N., R. 7 E., sec. 31. A crew of 10 men was employed on ribes eradication for 1 month to rework an area planted during the spring. The area adjacent to the plantation is reproducing satisfactorily to white pine and it is scheduled for working in 1948.

METHODS AND EQUIPMENT

Prior to opening camps a 2-day training school was held for the supervisory personnel. In addition to a review of ribes eradication and safety measures, the new training charts were demonstrated and emphasis was placed on reducing man-day costs. Workers were given continual training throughout the season.

An open crew formation on ribes eradication, with each man covering an area approximately one chain wide, was employed where possible. Several modifications in crew size and width of strip were used, depending upon visibility, number of ribes on the area, and type of labor available. Toward the latter part of the season one-man strips were used to good advantage. High caliber men such as crew leaders and straw bosses worked singly in adjoining strips approximately one rod wide. Had more time been available each man would have been assigned an individual block and it is felt that this would have increased both output and efficiency. One-man crews worked a total of 118 acres with results secured being well above those of regular three-man crews. Further application of this method is contemplated for the coming season. Aside from these methods, the conventional three-man handpulling crew was used in upland types. Where the caliber of workers permitted, individual three-man crews worked independently in assigned blocks; otherwise, they were worked in adjoining strips under the supervision of a straw boss or foreman.

In stream type spraying, the Bean-Cutler portable unit was used on one area. Two nozzles were employed either directly from the unit or with the use of main line and laterals. Mist Makers were used to good advantage on both initial and rework areas where only R. petiolare was present. The standard knapsack sprayer was also used. Work was done with the Hardie power unit on three different areas of upland. Two nozzles were used sometimes directly from the power unit but in the majority of cases with main line and laterals. As different types of nozzles were developed they were given practical tests and records were kept as to dosage and man-hours.

For use on roads not passable with a Hardie unit another power unit was developed on the Clearwater operation. This consisted of a two-wheel water trailer of approximately 265 gallon capacity with a Bean-Cutler pump mounted on the frame. In addition, a Pacific Marine pumper for filling the tank was placed on the frame. The trailer was pulled by an International T-9 tractor-dozer. This unit proved practical on the Clearwater operation, where many of the logging roads do not permit the use of regular trucks without considerable road repair work. Any obstruction which interferes with this unit can usually be removed without difficulty.

The following tabulation shows data for the power unit experiments:

Eradication						
<u>Area</u>	<u>Type</u>	<u>Equipment</u>	<u>Chemical</u>	<u>Acres</u>	<u>Man-Days</u>	<u>Gallons Spray</u>
Washington Creek	Cutover	Hardie	2,4-D	35	76	10,600
Flat Creek	Stream	Trailer	Ammate	16	31	1,227
Mutton Gulch	Cutover	Hardie	2,4-D	15	24	3,400
Summit Lookout	Cutover	Hardie	Ammate	1	2	700

CHECKING

All checking work was performed under the direct supervision of the checking foreman. Five checkers were employed by the Bureau, two of whom were experienced, and the Forest Service employed three checkers including one with previous experience. All worked areas were given a regular check except where the ribes were removed so late in the season that a check would be of little value. The intensity of the check was varied according to areas. Lower per cent checks were run where further work is indicated before a maintenance status can be reached. All necessary advance check was run prior to crew work.

CONTROL STATUS

The status of blister rust control work on the Clearwater National Forest is in a favorable condition. The size of the program for the past season and that contemplated for the coming field seasons appears to be adequate. A work plan has been developed which assures proper timing of work on areas considered for protection; cutting practices are being followed with a view to limiting ribes regeneration as much as possible and future plans regarding planting white pine take into consideration all phases of the blister rust problem.

A more difficult situation exists on the Clearwater Timber Protective Association. Blister rust infection, in varying degrees, occurs generally over the

entire area. Although 1941 was the last year in which a heavy infection wave was observed, there is a steady increase each year in the amount of infection. There are instances on small, unprotected areas where the reproduction that came in after the 1941 wave has been almost entirely lost. Many of the older cuttings have only a small amount of new infection because the control program was large enough to permit proper timing of ribes eradication work. Because of the smaller control program in recent years and the accelerated rate of cutting it is now impossible to perform ribes eradication at the proper time on all cutover areas which are reproducing satisfactorily to white pine. Under the smaller program efforts are being made to perform work on areas of highest priority considering such factors as stocking, cost of protection, accessibility and keeping areas worked in solid blocks representing various age classes. Logging of white pine is progressing at the rate of over 8,000 acres per year. Much of this as mature was classed on maintenance but it now reverts to the unworked cutover category. Very little of the work performed during the current season on Clearwater Protective Association lands can be placed in the maintenance classification because a large portion of the work was done on areas which were logged so recently that they have not yet become stabilized. It is considered that a period of 15 years must elapse after the last disturbance before an area can be classed as on a maintenance basis and observations have shown that some areas require an even longer period to become stabilized. With the amount of cutting taking place and with the smaller work program there is a decreasing amount of area being carried on maintenance each year.

For the entire Clearwater operation there is a total of 89,080 acres on maintenance. As a result of ribes eradication and checking work during the 1947 field season 847 acres were placed on a maintenance basis and 2,047 acres were removed from this category because of logging operations.

STATEMENT OF EXPENDITURES AND COSTS

The following tables show the statement of expenditures by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947 CLEARWATER OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 11,247.56
	Regular BLR-3-4	143,612.56
	Subtotal	154,860.12
State of Idaho Clearwater Timber Protective Association	State BLR-3-4	7,142.36
	Private BLR-3-4	6,422.40
	Subtotal	13,564.76
Forest Service	Regular BLR-4	126,138.88
Total		\$294,563.76

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
CLEARWATER OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Sal. perm. men	\$10,837.42	\$9,999.21		\$20,836.63	\$7,521.56	\$28,358.19
Sal. temp. men		16,180.16	\$2,636.18	18,816.34	17,384.06	36,200.40
Wages, temp. labs.		43,876.05	10,928.58	54,804.63	63,043.54	117,848.17
Subs. supplies		27,870.63		27,870.63	24,123.17	51,993.80
Equipment		11,203.64		11,203.64	2,216.49	13,420.13
Pur. trucks, cars		14,756.06		14,756.06		14,756.06
Travel & Transp.	307.20	5,224.82		5,532.02	2,771.07	8,303.09
Other Supplies	102.94	14,501.99		14,604.93	9,078.99	23,683.92
Total	\$11,247.56	\$143,612.56	\$13,564.76	\$168,424.88	\$126,138.88	\$294,563.76



TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1945-49	148	488	28,307	3.30	191
	Cutover (5)	1940-44	1,456	831	268,697	.57	185
	Cutover	1920-39	1,458	1,323	86,839	.91	60
	Reproduction	1910-39	664	765	40,501	1.15	61
	Pole		822	825	34,727	1.00	42
	Stream (1)		19	111	20,020	5.84	1,054
	Total		4,567	4,343	479,091	.95	105
Second	Plantation	1945-49	53	155	18,411	2.92	347
	Cutover	1940-44	440	545	53,763	1.24	122
	Cutover	1920-39	797	737	32,575	.92	41
	Reproduction	1910-39	1,560	2,198	77,812	1.41	50
	Pole		1,227	462	15,573	.38	13
	Total		4,077	4,097	198,134	1.00	49
Third	Plantation	1940-44	60	45	1,116	.75	19
	Cutover	1920-39	3,255	1,502	48,879	.46	15
	Reproduction	1910-39	883	685	13,894	.78	16
	Pole		666	400	12,426	.60	19
	Stream (3)		42	118	60,612	2.81	1,443
	Total		4,906	2,750	136,927	.56	28
All Workings	Plantation	1945-49	201	643	46,718	3.20	232
	Plantation	1940-44	60	45	1,116	.75	19
	Cutover (6)	1940-44	1,896	1,376	322,460	.73	170
	Cutover	1920-39	5,510	3,562	168,293	.65	31
	Reproduction	1910-39	3,107	3,648	132,207	1.17	43
	Pole		2,715	1,687	62,726	.62	23
	Stream (4)		61	229	80,632	3.75	1,322
	Total		13,550	11,190	814,152	.83	60

Chemical work included above:

Stream				Upland			
	Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray
(1)	19	111	1,787	(5)	61	102	14,700
(3)	42	118	5,319	(6)	61	102	14,700
(4)	61	229	7,106				

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
CLEARWATER OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	1,923	2,105	369,346	15,927	1.09	192
		FS-Reg.	2,644	2,238	109,745	560	.85	42
		Total	4,567	4,343	479,091	16,487	.95	105
	Second	EQ-Coop.	1,815	2,162	131,849		1.19	73
		FS-Reg.	2,262	1,935	66,285		.86	29
		Total	4,077	4,097	198,134		1.00	49
	Third	EQ-Coop.	3,496	1,691	54,103	27	.48	15
		FS-Reg.	1,410	1,059	82,824	5,292	.75	59
		Total	4,906	2,750	136,927	5,319	.56	28
	All Workings	EQ-Coop.	7,234	5,958	555,298	15,954	.82	77
		FS-Reg.	6,316	5,232	258,854	5,852	.83	41
		Total	13,550	11,190	814,152	21,806	.83	60



TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
CLEARWATER OPERATION

State	Working	Acres Worked											
		By Forest Service			By Bureau of Entomology and Plant Quarantine				Total				
		National Forest	Private	Total	National Forest	State	Private	Total	Federal Forest	Other			Total
										State	Private	Total	
Idaho	First	2,644		2,644	50	1,087	786	1,923	2,694	1,087	786	1,873	4,567
	Second	2,142	120	2,262		269	1,546	1,815	2,142	269	1,666	1,935	4,077
	Third	1,410		1,410	120	385	2,991	3,496	1,530	385	2,991	3,376	4,906
	Total	6,196	120	6,316	170	1,741	5,323	7,234	6,366	1,741	5,443	7,184	13,550

TABLE 6

RIBES SPECIES ERADICATED, 1947
CLEARWATER OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes petiolare	
First	Plantation (1945-49)	148	14,616	13,579	112	28,307
	Cutover (1940-44)	1,456	8,821	259,004	872	268,697
	Cutover (1920-39)	1,458	26,090	57,909	2,840	86,839
	Reproduction (1910-39)	664	39,012	427	1,062	40,501
	Pole	822	33,820	46	861	34,727
	Stream	19	3,910	120	15,990	20,020
Second	All Types	4,567	126,269	331,085	21,737	479,091
	Plantation (1945-49)	53	554	17,850	7	18,411
	Cutover (1940-44)	440	4,643	48,978	142	53,763
	Cutover (1920-39)	797	11,238	20,522	815	32,575
	Reproduction (1910-39)	1,560	72,800	2,296	2,716	77,812
	Pole	1,227	11,904	3,641	28	15,573
Third	All Types	4,077	101,139	93,287	3,708	198,134
	Plantation (1940-44)	60	462	654		1,116
	Cutover (1920-39)	3,255	16,455	30,962	1,462	48,879
	Reproduction (1910-39)	883	9,811	4,083		13,894
	Pole	666	7,559	4,398	469	12,426
	Stream	42	26,150		34,462	60,612
All Workings	All Types	4,906	60,437	40,097	36,393	136,927
	Plantation (1945-49)	201	15,170	31,429	119	46,718
	Plantation (1940-44)	60	462	654		1,116
	Cutover (1940-44)	1,896	13,464	307,982	1,014	322,460
	Cutover (1920-39)	5,510	53,783	109,393	5,117	168,293
	Reproduction (1910-39)	3,107	121,623	6,806	3,778	132,207
	Pole	2,715	53,283	8,085	1,358	62,726
	Stream	61	30,060	120	50,452	80,632
	All Types	13,550	287,845	464,469	61,838	814,152

TABLE 7

SUMMARY OF RIBES ERADICATION, 1929-1947
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	148	488	28,307	3.30	191	148	
	Cutover	1945-49							5,864
	Plantation	1940-44	60	232	134,749	3.87	2,246	60	
	Cutover (5)	1940-44	6,797	9,604	4,718,767	1.41	694	6,797	28,412
	Cutover	1920-39	39,166	40,222	13,653,624	1.03	349	35,343	29,890
	Reproduction	1910-39	71,993	109,096	33,469,252	1.52	465	71,277	3,584
	Pole		31,076	18,314	3,874,014	.59	125	29,767	5,180
	Mature		219,289	99,880	23,422,354	.46	107	162,687	39,728
	Miscellaneous		5,852	3,900	1,700,804	.67	291	5,416	7,819
	Stream (1)		42,372	78,235	14,078,144	1.85	332	42,372	13,656
Second	Total		416,753	359,971	95,080,015	.86	228	353,867	134,133
	Plantation	1945-49	53	155	18,411	2.92	347	53	
	Plantation	1940-44	60	194	15,587	3.23	260	60	
	Cutover	1940-44	520	619	57,971	1.19	111	520	
	Cutover	1920-39	31,055	30,151	8,251,650	.97	266	31,055	
	Reproduction	1910-39	26,092	40,621	3,727,692	1.56	143	26,016	
	Pole		16,448	8,549	1,132,276	.52	69	15,809	
	Mature		16,333	7,983	815,665	.49	50	14,173	
	Miscellaneous		511	573	371,107	1.12	726	511	
	Stream (2)		23,780	26,966	3,329,143	1.13	140	23,780	
Third	Total		114,852	115,811	17,719,502	1.01	154	111,977	
	Plantation	1940-44	60	45	1,116	.75	19	60	
	Cutover	1920-39	15,582	15,213	1,120,606	.98	72	15,582	
	Reproduction	1910-39	7,264	10,025	458,180	1.39	63	7,264	
	Pole		1,843	1,155	26,335	.63	14	1,843	
	Stream (3)		3,370	3,891	396,360	1.15	118	3,370	
All Workings	Total		28,119	30,329	2,002,597	1.08	71	28,119	
	Plantation	1945-49	201	643	46,719	3.20	232	201	
	Plantation	1940-44	180	471	151,452	2.62	841	180	
	Cutover (6)	1940-44	7,317	10,223	4,776,738	1.40	653	7,317	
	Cutover	1920-39	85,803	85,586	23,025,880	1.00	268	81,980	
	Reproduction	1910-39	105,349	159,742	37,655,124	1.52	357	104,557	
	Pole		49,367	28,018	5,032,625	.67	102	47,419	
	Mature		235,622	107,863	24,239,019	.46	103	176,860	
	Miscellaneous		6,363	4,473	2,071,911	.70	326	5,927	
	Stream (4)		69,522	109,092	17,803,647	1.57	256	69,522	
All Workings	Total		559,724	506,111	114,802,114	.90	205	493,963	

Chemical work included above:

Stream				Upland			
Acres	Man-Days	Gallons Spray		Acres	Man-Days	Gallons Spray	
(1) 15,046	31,302	796,385		(5) 61	102	14,700	
(2) 5,875	8,142	119,985		(6) 61	102	14,700	
(3) 860	1,414	25,114					
(4) 21,781	40,858	941,484					

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1947
CLEARWATER OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	4,412	5,273	1,129,228	79,964	1.30	256
	EW-Coop.	56,599	52,116	7,348,706	165,329	.92	130
	EQ-Emerg.	133,970	125,277	30,398,093	136,847	.94	227
	FS-Reg.	121,353	112,195	28,789,422	150,832	.92	237
	FS-Emerg.	55,908	45,382	14,895,022	24,015	.81	266
	CCC	187,432	165,868	32,241,643	408,597	.88	172
Idaho	Total	559,724	506,111	114,802,114	955,484	.90	205

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1947
CLEARWATER OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acree Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	154,101	53,682	10,258	218,041	46,251	200,352
	Public Domain	3,690	708	52	4,450	540	4,030
	Subtotal Federal	157,791	54,390	10,310	222,491	46,591	204,382
	State	61,212	14,169	1,855	77,236	29,046	90,258
	Private	134,854	43,418	15,954	194,236	58,496	193,360
	Subtotal Other	196,076	57,587	17,809	271,472	87,542	233,618
	Total	353,867	111,977	28,119	493,963	134,133	488,000



BLISTER RUST CONTROL WORK, ST. JOE OPERATION, 1947

By

H. J. Hartman, Operation Supervisor
D. J. Moore, Forester, U. S. Forest Service
W. F. Painter, Assistant Operation Supervisor
R. H. Kliewer, Unit Supervisor

INTRODUCTION

Blister rust control work was continued on the St. Joe operation for the nineteenth consecutive year. The operation comprises 884,925 acres of western white pine type in the St. Joe National Forest and Potlatch Timber Protective Association. During the past 12 years approximately 124,000 acres of western white pine type have been logged. No control measures have been attempted on these cutover areas. Species composition and density of the residual stands has prevented satisfactory re-establishment of white pine on 85 per cent of the area. Logging disturbance caused heavy ribes regeneration and nearly all white pine seedlings are infected with blister rust. The lack of funds, labor, practical spray equipment, and a satisfactory chemical has necessitated deferment of these logged areas. Chemical eradication with power sprayers will be initiated next year on some of the better logged areas.

At the close of the 1947 field season 479,930 acres had been worked initially, 153,127 acres worked the second time, and 58,715 acres three or more times. About 50 per cent of the control area is either on maintenance or in a sufficiently satisfactory status to be brought through to maturity under the present program. The remaining 50 per cent is receiving no protection under the present small-scale control program.

ORGANIZATION AND ADMINISTRATION

Control activities were organized in accordance with agreements between federal, state, and private agencies. Personnel of the Bureau of Entomology and Plant Quarantine provided assistance in the over-all planning, coordination, and technical direction of the program on lands of all ownership. The Bureau administered the state and private cooperative control program, consisting of five camps located within the boundaries of the Potlatch Timber Protective Association. Three of the camps worked state and private land in the Cameron, Oviat, and Long Meadow drainages. Two camps financed entirely with federal funds worked on land of intermingled ownership in the Purdue and Moose Creek drainages. The Forest Service financed and administered the work of nine camps on National Forest lands in the West Fork of Potlatch, West Fork of St. Maries River, Emerald, Charlie, and Ramskull drainages.

The work season averaged $2\frac{1}{2}$ months per camp. All Bureau camps were closed in early August due to a shortage of funds. The labor was mostly high school and college students. The labor supply improved substantially over last year, although skilled workers and supervisory personnel were very scarce. Labor efficiency improved over that of the preceding year, but is still well below prewar levels. An increase in cost of supplies and some wage increases sent cost of control work to a new high.

The blister rust control 1947 field organization was as follows:

Bureau of Entomology and Plant Quarantine

U. S. Forest Service

H. J. Hartman, Operation Supervisor

D. J. Moore, Forest Officer

W. F. Painter, Assistant Operation Supervisor

Clyde Miller, Checker Foreman

R. H. Kliever, Unit Supervisor

F. A. Moore, Unit Supervisor

R. E. Myers, Agent (Special Duty Assistant)

F. K. Winch, Unit Supervisor

<u>Program</u>	<u>Number Camps</u>	<u>Number Workers</u>	<u>Number Checkers</u>
E.Q. - Cooperative	5	250	7
F.S. - Regular	9	435	7

Total number employed on blister rust control - 699

Field headquarters at Clarkia, Idaho, maintained by the Bureau, was the operating base for all Bureau and some Forest Service activities. The warehousing and supplying of subsistence for Forest Service camps were handled through the Clarkia Ranger Station.

LOCATION AND DESCRIPTION OF AREAS

<u>Drainage</u>	<u>T</u>	<u>R</u>	<u>S</u>	<u>Date Established</u>	<u>Date Closed</u>	<u>Class of Labor</u>	<u>Size</u>
BUREAU - COOPERATIVE CAMPS							
Round Meadow Creek	39N	1E	3	June 9	Aug. 15	Students	50
Butterfield Creek	39N	1E	2	May 22	Aug. 8	Students	50
Cameron Creek	40N	2E	32	June 9	Aug. 1	Students	50
Purdue Creek	41N	1E	18	May 12	Aug. 9	Students	50
Moose Creek	41N	1W	23	May 15	Aug. 15	Students	50
FOREST SERVICE CAMPS							
W. F. Potlatch Creek	41N	1W	1	June 5	Sept. 2	Students	45
Porcupine Creek	42N	1E	31	June 30	Aug. 27	Students	33
Mazie Creek	42N	1E	24	June 11	Sept. 3	Students	45
Bechtel Creek	42N	1E	12	May 14	Aug. 28	Students	45
W. F. Emerald Creek	43N	1E	32	June 18	Aug. 27	Students	45
E. F. Charlie Creek	43N	2W	14	June 16	Sept. 10	Students	45
S. F. Charlie Creek	43N	2W	15	June 11	Aug. 29	Students	45
S. F. Charlie Creek	43N	2W	27	June 25	Aug. 29	Students	45
Ramskull Creek	43N	2W	6	June 10	Sept. 5	Students	45

While blister rust infection on the St. Joe is very critical, there has been no appreciable amount of new pine infection since the very heavy wave in 1941. All control efforts were directed toward the protection of large bodies of well-stocked reproduction and pole stands of western white pine on sites I and II. All camps were engaged in second, third, and fourth workings. Second working averaged 22 ribs and .89 man-days per acre and third working averaged 10 ribs and .77 man-days per acre. The length of time between workings ranged from 5 to 13 years.

METHODS AND EQUIPMENT

A training school was held for blister rust control supervisory personnel. A complete review of ribes eradication, first aid, and safety was presented. Straw bosses and crewmen were trained on the job. Effective use was made of the new training charts.

Ribes eradication crews ranged from one to three men. Crews worked independently in so far as adequate supervision and dependability of crew members permitted. The flanker method of ribes eradication was used in several camps. Ammonium sulfamate and 2,4-D were widely used in ribes decapitation and in spraying stream type ribes.

Blister rust control has become an extremely important element in the timber management plan now being developed on the St. Joe operation by the Forest Service. For this reason timber management working circle and logging boundaries and the blister rust control working unit boundaries have been made to coincide. In addition timber sale policy and marking practices on forest owned lands in the white pine units are now being made with full cognizance of the disease problem.

CHECKING

The checking organization consisted of 1 checker foreman and 14 checkers. The salaries of the checkers were financed jointly by the Forest Service and Bureau. The checker foreman was directly responsible for the training and supervision of the men in the field. The over-all direction of checking was continued by the Bureau. The method of checking areas by working two checkers together along a check strip was continued. This system is especially applicable to areas of low ribes population and provides the additional information needed on such areas in order to properly evaluate the number and distribution of ribes.

The substantial increase of qualified personnel over previous seasons made it possible to inspect not only the 1947 ribes eradication areas but to carry on an expanded post check program for the inspection of areas classified as post check and maintenance. A total of 40,081 acres were inspected, of which 14,825 acres were regular check and 25,256 acres of post check and maintenance.

SURVEYS

A three-man disease survey crew inspected areas on which additional and new data were needed. A summary of the disease survey data is shown in the following table:

PINE DISEASE SURVEY SUMMARY, 1947

Area	Age Class	T	R	Section	Examined	Number of Trees			
						Infected		With Killing Cankers	
						No.	Per Cent	No.	Per Cent
Purdue	11-20	41N	1W	13	253	55	22	47	19
Collins	11-20	41N	1E	6-7	772	98	13	78	10
Nat Brown	11-20	41N	1E	7-8	690	292	42	242	35
Cameron	11-20	40N	2E	31	616	402	65	223	36
Lindley	11-20	40N	2E	22-27	282	139	49	94	33
W. F. Lindley	11-20	40N	2E	21-22-27 28	378	239	63	189	50
Upper Charlie	0-10	43N	2W	21-22-27 28	1,860	259	14	245	13
Emerald	11-20	43N	1E	3-4-5-32 33-34	4,543	1,800	40	615	14
Bechtel	11-20	42N	1E	11-12-13 23-24-25	2,395	839	35	439	18
W. F. St. Maries	21-40	42N	1E	26	1,831	597	33	234	13
Hidden	11-20	42N	1E	22-23-26 27	795	273	34	88	11
Keeler	11-20	42N	1E	26-27-34 35	3,327	937	28	325	10

A five-man pine stocking survey crew, financed from Forest Service funds, inspected 10,250 acres of reproduction and pole. The survey procedure was the same as that in 1946 and the surveys were begun subsequent to the close of the ribes eradication season. Per cent of pine, degree of stocking, site quality, composition and age class were determined. Such data are of great importance in establishing priority for control work among the white pine working units.

CONTROL STATUS

There were 150,840 acres of maintenance as of December 31, 1947. The breakdown by ownership is: federal 69,642, state and private 81,198. All figures will be subject to corrections upon the completion of the working unit summaries and when the logging data for 1947 on worked mature areas become available.

As a result of the 1947 ribes eradication and checking 5,371 acres were placed on maintenance. In addition a total of 5,657 acres previously classified as maintenance was inspected during the summer. The entire acreage was returned to maintenance after spot workings were made within the area.

A total of 2,881 acres of maintenance area was lost due to 1946 logging.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947 ST. JOE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 14,827.16
	Regular BLR-3-4	151,809.90
	Subtotal	\$166,637.06
State of Idaho	State BLR-3-4	\$ 4,397.74
Potlatch Timber Protective Association	Private BLR-3-4	5,420.30
	Subtotal	\$ 9,818.04
Forest Service	Regular BLR-4	\$216,530.01
Total		\$392,985.11

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
ST. JOE OPERATION

Item	Bureau of Entomology and Plant Quarantine				Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Total	Regular BLR-4	Total
Sal. perm. men	\$13,612.24	\$10,735.22		\$24,347.46	\$19,303.87	\$43,651.33
Sal. temp. men		13,648.93	\$1,614.74	15,263.67	29,275.35	44,539.02
Wages, temp. labs.		48,700.49	8,203.30	56,903.79	106,783.99	165,687.78
Subs. supplies		32,792.85		32,792.85	37,636.87	70,429.72
Equipment		9,920.17		9,920.17	18,078.66	27,998.83
Trucks		14,756.06		14,756.06		14,756.06
Travel and transp.	406.05	5,400.18		5,806.23	4,245.60	10,051.83
Other supplies	808.87	15,856.00		16,664.87	1,205.67	17,870.54
Total	\$14,827.16	\$151,809.90	\$9,818.04	\$176,455.10	\$216,530.01	\$392,985.11

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Reproduction	1910-39	51	101	2,093	1.98	41
	Stream (1)		64	145	8,054	2.27	126
	Total		115	246	10,147	2.14	88
Second	Plantation	1940-44	55	144	1,640	2.62	30
	Cutover	1920-39	582	897	17,935	1.54	31
	Reproduction	1910-39	3,582	3,101	63,588	.87	18
	Pole		1,414	666	25,714	.47	18
	Stream (2)		197	381	20,344	1.93	103
	Total		5,830	5,189	129,221	.89	22
Third	Plantation	1940-44	276	629	5,735	2.28	21
	Cutover	1920-39	4,292	2,026	22,232	.47	5
	Reproduction	1910-39	4,572	4,556	44,218	1.00	10
	Pole		4,139	2,625	37,247	.63	9
	Stream (3)		920	1,126	28,954	1.22	31
	Total		14,199	10,962	138,386	.77	10
All Workings	Plantation	1940-44	331	773	7,375	2.34	22
	Cutover	1920-39	4,874	2,923	40,167	.60	8
	Reproduction	1910-39	8,205	7,758	109,899	.95	13
	Pole		5,553	3,291	62,961	.59	11
	Stream (4)		1,181	1,652	57,352	1.40	49
	Total		20,144	16,397	277,754	.81	14

Chemical work included above:

			Gallons
	Acres	Man-Days	Spray
(1)	64	145	1,205
(2)	66	97	1,253
(3)	447	365	408
(4)	577	607	2,866

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
ST. JOE OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	20	61	1,245		3.05	62
		FS-Reg.	95	185	8,902	1,205	1.95	94
		Total	115	246	10,147	1,205	2.14	88
	Second	EQ-Coop.	3,566	3,062	65,279		.86	18
		FS-Reg.	2,264	2,127	63,942	1,253	.94	28
		Total	5,830	5,189	129,221	1,253	.89	22
	Third	EQ-Coop.	5,863	3,224	43,863		.55	7
		FS-Reg.	8,336	7,738	94,523	408	.93	11
		Total	14,199	10,962	138,386	408	.77	10
	All Workings	EQ-Coop.	9,449	6,347	110,387		.67	12
		FS-Reg.	10,695	10,050	167,367	2,866	.94	16
		Total	20,144	16,397	277,754	2,866	.81	14

TABLE 5
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
ST. JOE OPERATION

State	Working	Acres Worked																
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total						
												Federal		Other				
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	Total	
Idaho	First	82			13	95				20	20	82				33	33	115
	Second	1,621	242	48	353	2,264	1,727		389	1,450	3,566	3,348	242	437	1,803	2,240	5,830	
	Third	5,858	510	259	1,709	8,336	2,197	120	745	2,801	5,863	8,055	630	1,004	4,510	5,514	14,199	
	Total	7,561	752	307	2,075	10,695	3,924	120	1,134	4,271	9,449	11,485	872	1,441	6,346	7,787	20,144	

TABLE 6
RIBES SPECIES ERADICATED, 1947
ST. JOE OPERATION

Working	Eradication Type	Acres	Ribes Species				Total Ribes
			Ribes lacuetre	Ribes viecosiesimum	Ribes petiolare	Ribes inerme	
First	Reproduction (1910-39)	51	699	1,394			2,093
	Stream	64	8,049	5			8,054
	All Types	115	8,748	1,399			10,147
Second	Plantation (1940-44)	55	1,617	23			1,640
	Cutover (1920-39)	582	9,956	7,979			17,935
	Reproduction (1910-39)	3,582	23,180	38,989		1,419	63,588
	Pole	1,414	5,334	20,369		11	25,714
	Stream	197	13,301	7,043			20,344
	All Types	5,830	53,368	74,403		1,430	129,221
Third	Plantation (1940-44)	276	5,275	460			5,735
	Cutover (1920-39)	4,292	13,726	8,205	301		22,232
	Reproduction (1910-39)	4,572	17,335	25,802	51	1,030	44,218
	Pole	4,139	20,536	16,494	209	8	37,247
	Stream	920	18,508	8,398	1,919	129	28,954
	All Types	14,199	75,380	59,359	2,480	1,167	138,386
All Workings	Plantation (1940-44)	331	6,892	483			7,375
	Cutover (1920-39)	4,874	23,682	16,184	301		40,167
	Reproduction (1910-39)	8,205	41,214	66,185	51	2,449	109,899
	Pole	5,553	25,870	36,863	209	19	62,961
	Stream	1,181	39,858	15,446	1,919	129	57,352
	All Types	20,144	137,516	135,161	2,480	2,597	277,754



TABLE 7

SUMMARY OF RIBES ERADICATION, 1929 - 1947
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Cutover	1945-49							4,021
	Plantation	1940-44	2,209	4,763	1,092,843	2.16	495	2,209	
	Cutover	1940-44	308	221	14,730	.72	48	308	34,933
	Cutover	1920-39	16,291	11,381	3,596,739	.70	221	16,291	156,898
	Reproduction	1910-39	217,952	241,287	81,168,769	1.11	372	217,745	104,721
	Pole		86,838	33,082	7,780,055	.38	90	86,750	18,516
	Mature		177,162	68,756	17,998,538	.39	102	118,421	85,906
	Miscellaneous		2,652	2,297	767,429	.87	289	2,652	
	Stream (1)		35,554	97,368	23,381,631	2.74	658	35,554	
	Total		538,966	459,155	135,800,734	.85	252	479,930	404,995
Second	Plantation	1940-44	1,198	1,207	57,827	1.01	48	1,198	
	Cutover	1920-39	7,684	8,519	549,431	1.11	72	7,684	
	Reproduction	1910-39	84,493	100,199	9,212,218	1.19	109	84,493	
	Pole		38,503	22,414	1,344,093	.58	35	38,415	
	Mature		8,965	6,831	821,719	.76	92	8,055	
	Miscellaneous		431	43	2,567	.10	6	431	
	Stream (2)		12,851	27,966	5,214,670	2.18	406	12,851	
Third	Total		154,125	167,179	17,202,525	1.08	112	153,127	
	Plantation	1940-44	518	929	18,214	1.79	35	518	
	Cutover	1920-39	6,052	4,119	77,758	.68	13	6,052	
	Reproduction	1910-39	31,776	51,216	1,043,871	1.61	33	31,776	
	Pole		9,819	5,927	115,572	.60	12	9,819	
	Mature		170	325	38,042	1.91	224	170	
	Stream (3)		10,380	17,126	1,831,190	1.65	176	10,380	
All Working	Total		58,715	79,642	3,124,647	1.36	53	58,715	
	Plantation	1940-44	3,925	6,899	1,168,884	1.76	298	3,925	
	Cutover	1940-44	308	221	14,730	.72	48	308	
	Cutover	1920-39	30,027	24,019	4,223,923	.80	141	30,027	
	Reproduction	1910-39	334,221	392,702	91,424,858	1.17	274	334,014	
	Pole		135,160	61,423	9,239,720	.45	68	134,984	
	Mature		186,297	75,912	18,858,299	.41	101	126,646	
	Miscellaneous		3,083	2,340	769,996	.76	250	3,083	
	Stream (4)		58,785	142,460	30,427,491	2.42	518	58,785	
	Total		751,806	705,976	156,127,906	.94	208	691,772	

Chemical work included above:

	Acres	Man-Days	Gallons Spray
(1)	7,484	21,878	671,573
(2)	3,327	4,858	113,162
(3)	3,246	3,571	28,570
(4)	14,057	30,307	813,305

TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1947
ST. JOE OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	55,143	48,053	5,021,747	64,944	.87	91
	EQ-Emerg.	234,519	157,898	43,593,387	77,088	.67	186
	FS-Reg.	198,921	229,542	35,289,563	321,091	1.15	177
	FS-Emerg.	70,981	45,138	15,333,106	101,476	.64	216
	CCC	192,242	225,345	56,890,303	248,706	1.17	296
	Total	751,806	705,976	156,127,906	813,305	.94	208

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1947
ST. JOE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	215,281	82,449	32,525	330,255	96,927	312,208
	Public Domain	12,458	5,411	2,308	20,177	12,007	24,465
	Subtotal Federal	227,739	87,860	34,833	350,432	108,934	336,673
	State	57,903	20,040	6,472	84,415	57,166	115,069
	Private	194,288	45,227	17,410	256,925	239,895	433,183
	Subtotal Other	252,191	65,267	23,882	341,340	296,061	548,252
	Total	479,930	153,127	58,715	691,772	404,995	884,925

BLISTER RUST CONTROL WORK, COEUR D'ALENE OPERATION, 1947

By

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INTRODUCTION

The month of May was warm and dry and ideal for ribes eradication. Advantage could not be taken of this, as all available personnel were engaged in planting. The remainder of the season was interrupted by rain more than normally. Training activities during June were repeatedly postponed. Though the employment peak had been reached by the first of July, only 900 acres had been worked.

Men who had passed their 18th birthday were employed, and a large number of them were experienced. Consequently, the quality of the crews was quite high. As for supervisory personnel, only one experienced foreman was available for the six camps. For this reason, it is felt that some of the crews were not developed to their fullest capacities. A total of 280 men were hired prior to the first of August to keep 235 positions filled. Thereafter men started leaving and no replacements were hired.

The Forest Service was responsible for the administration and operation of all camps, while technical supervision was provided by the Bureau of Entomology and Plant Quarantine.

LOCATION AND DESCRIPTION OF AREAS

1. Lone Cabin Camp, working unit No. 1. This work was located in secs. 10, 11, 12, 13, 14 and 15 of T. 51 N., R. 2 W. This was a third working on areas cut over in 1927. A disease survey in 1945 showed 6.2 per cent infection. Because of the presence of small bushes, only 68 acres have been placed on maintenance. Training commenced on June 3, and work was discontinued on August 11.

2. Hudlow Camp, working unit Nos. 2 and 5. Work was performed in secs. 25 and 26 of T. 52 N., R. 2 W., and secs. 8, 9, 16, and 17 of T. 52 N., R. 1 W. The Solitaire area was logged in 1935, broadcast burned in 1937 and planting was started in the fall of 1937. This timing multiplied the blister rust problem. In an effort to save the planted trees, all of the area has been worked three times and a part of it has received five workings. A 1945 survey showed that 9.3 per cent of the trees had killing cankers on them. It has since increased to an estimated 20 per cent. It will be necessary to work most of this area again. Work was also performed in the pole stand on the West Fork of Hudlow. Training was commenced on June 17 and the camp was closed on September 5.

3. Independence Camp, working unit No. 28. Work was performed in secs. 2 and 3 of T. 52 N., R. 1 E., and sec. 34 of T. 53 N., R. 1 E. This camp was established late in April for planting purposes, and the personnel were trained for blister rust on June 10. Work was discontinued August 12. A 1944 burn was planted this year, and some natural reproduction was filled in with planted trees. Effective control work in 1941 is apparently the reason pine infection has not increased. Most of this area may be considered in a safe condition, but because of the new planting it will be kept under observation for a few years.

4. West Elk Camp, working unit Nos. 34 and 35. Work was performed in secs. 19, 29, 30, 31 and 32 of T. 53 N., R. 3 E., and secs. 13, 14, 15, 22, 23, 24 and 25 of T. 53 N., R. 2 E. A second working was given a 1927 plantation in West Elk drainage. Only 3 per cent of these trees were found to be infected in 1946. Working conditions on this area are quite severe. A 1929 plantation on the East Fork, which showed 6 per cent infection in 1946, was given a first working. Four hundred and forty acres of these plantations are now on maintenance. Training was started on June 11 and work was discontinued on August 29.

5. Jordan Camp, working unit No. 34. Second and third workings were performed in secs. 14, 15, 16, 17, 20, 21, 22 and 23 of T. 53 N., R. 3 E. These areas are 1924, 1925 and 1926 plantations. Early ribes eradication has prevented an infection build-up, and it continues to be very light and scattered. One thousand six hundred acres are now in a maintenance condition. Training was started on June 4 and work was stopped on September 15.

6. Steamboat Camp, working unit No. 43. Work was done in secs. 26, 27, 34 and 35 of T. 51 N., R. 2 E. This was an experimental 10-man unit established to broadcast spray recently logged areas. A Hardie mobile sprayer was used until July 31, and then four Mist Makers were operated until August 28. A solution of 2,4-D was sprayed on 142 acres. Effectiveness of this work will not be known until next year.

WORKING METHODS

Training charts were used for the first time with marked success. Two teams, each composed of a unit supervisor and three trained assistants, gave all crews their first two days of training. This method was particularly successful in teaching the life cycle, ribes identification and crew formations. Camp foremen and unit supervisors had previously attended a 3-day training school.

With the exception of one camp, all men were initially trained to work in a three-man crew. In the Jordan Camp, only two-man crews were trained from the outset. Following the success noted here, the men in other camps were trained to work as two-man crews. In this formation, the crew leader lays the string, which places him in a position to gauge the width of strip. Close supervision was necessary to maintain maximum width of strip. One-man crews were used where ribes and brush conditions were light, and is favored wherever practical. The flanker system was also used extensively on the Jordan and West Elk areas.

A new era was entered when sprays were used for the first time. Ammate, applied from knapsack sprayers, was used on all stream type ribes and 2,4-D was used experimentally on upland ribes in the Steamboat drainage.

CONTRACT WORK

A contract for hand eradication of ribes was let for the first time in the Northwest Region. An area in the head of Straight Creek (working unit No. 24) of 111 acres was selected. This was considered a fairly easy eradication chance, with ribes varying from 150 per acre evenly distributed in Block 1, to 30 per acre in Blocks 2 and 3 with a patchy distribution. No bids were received when the work was first advertised. After giving the project a little more publicity, a bid

of \$9.00 per acre was accepted from two straw bosses. Due to technicalities, actual work did not commence until September 3, with October 13 set as the date for completion of contract.

Adverse weather set in, which forced the contractors to hire two helpers in an attempt to complete the work on schedule. Unfavorable weather continued and on October 4 the contractors were relieved of this responsibility. Eighty-one acres had been completed on which seventy-eight man-days had been spent. Final payment was made after 37 acres had been reworked and rechecked. There were 7,110 ribs destroyed or an average of 88 per acre.

It was interesting to note that these men used the same crew methods that were used in supervised work. Had it been possible for them to start work on an earlier date, it is believed their production rate would have been greater. As it was, they netted slightly less than wages, though there was a saving to the government in excess of one thousand dollars.

CHECKING AND SURVEYS

A post check survey was in progress all summer. This resulted in 10,000 acres being covered as tabulated below:

	<u>Miles of Strip</u>
West Elk Creek Area	38.3
Jordan Creek	7.6
Coffee Creek	12.6
Honey Burn	4.7
Llewelling Creek	22.9
Squirrel Creek	6.7
Iron Creek	5.7
Nicholas Burn	14.1
Burnt Cabin Area	8.4
Cathcart Creek	25.3
Phantom Creek	35.4
Hudlow Creek	4.0
Stella Creek	51.7
Riley Creek Area	<u>17.8</u>
Total	255.2

A disease survey was conducted after all other activities had ceased. Bad weather and lack of personnel made it impossible to complete this project. Information on the following areas was obtained:

<u>Area</u>	<u>Miles Strip</u>	<u>Trees Examined</u>	<u>Trees Infected</u>	<u>Per Cent Trees Infected</u>
Cathcart Creek, secs. 6, 7, 18, T. 51 N., R. 1 W.; secs. 1, 12, T. 51 N., R. 2 W.	12.2	4,566	663	14.5
Honey Burn, sec. 36, T. 53 N., R. 2 W.; sec. 32, T. 53 N., R. 1 W.; secs. 5, 6, T. 52 N., R. 1 W.	2.2	2,763	24	.9
Nicholas Burn, secs. 1, 2, T. 51 N., R. 2 W.; secs. 35, 36, T. 52 N., R. 2 W.	4.9	4,479	290	6.5
Pine Flats Creek, secs. 29, 30, 31, 32, T. 52 N., R. 4 E.	2.0	219	20	9.1
Loading Creek, secs. 3, 4, 5, T. 50 N., R. 4 E.	6.4	4,908	431	8.8
Lower Lost Creek, secs. 2, 3, 9, 11, T. 50 N., R. 4 E.; secs. 34, 35, T. 51 N., R. 4 E.	7.2	1,815	267	14.7
Tributary Creek, sec. 24, T. 50 N., R. 5 E.; sec. 19, T. 50 N., R. 6 E.	1.9	515	25	4.9
Bloom Peak, secs. 21, 28, T. 51 N., R. 5 E.	1.6	299	76	25.7

CONTROL STATUS

Most of the areas on which work was undertaken this year fell into a medium or light work classification. However, interspersed throughout the larger blocks of easy control opportunities are problem areas ranging in size from 20 to 100 acres. Located just under ridge tops or in the heads of small streams, these areas are usually the most inaccessible. Hand pulling has required excessive man-days in order to accomplish effective work. They are quite often nonproducing, but represent a constant threat to the young plantations below them, some of which are on maintenance. It is hoped future chemical discoveries will help solve this problem.

After next year, virtually all of the extensive plantations on the Magee ranger district may be considered in a safe condition. These represent the largest block of young growth in this status. Work is gradually falling behind on large blocks of natural reproduction located in the Magee and Wallace districts. The program must be enlarged before these can receive their needed attention.

Except for damage occurring along streams, most of the stands in the pole class are in fair condition. Losses will be extended unless cleanup work can be performed on them. It is hoped to allocate one camp to this age class next year in Upper Teepee Creek.

When upland ribes can be effectively eradicated by chemical means, it will not be difficult to keep abreast of current logging operations. Most sales are being made on a partial cut basis, which does not create a control problem initially. Heavy losses are being taken in the older logged areas in the North Fork country, except on those where it has been possible to maintain control schedules.

There are now 95,785 acres on maintenance, which represent a net gain of only 290 acres for 1947.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures is shown in the following tables by the cooperative agency and the type of appropriation.

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947 COEUR D'ALENE OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 4,198.87
Forest Service	Regular BLR-4	139,647.30
Total		\$143,846.17

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947 COEUR D'ALENE OPERATION

Item	Bureau of Entomology and Plant Quarantine	Forest Service	Total
	Regular BLR-1-4	Regular BLR-4	
Contract work		\$ 721.25	\$ 721.25
Sal. perm. men	\$4,030.57	9,505.70	13,536.27
Sal. temp. men		10,730.15	10,730.15
Wages, temp. labs.		84,071.12	84,071.12
Subs. supplies		25,696.37	25,696.37
Equipment		1,113.03	1,113.03
Travel and Transp.	168.30	2,794.97	2,963.27
Other supplies		5,014.71	5,014.71
Total	\$4,198.87	\$139,647.30	\$143,846.17



TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-44	142	213	56,800	1.50	400
	Reproduction	1910-39	767	349	9,278	.46	12
	Stream (1)			57	2,030		
Second	Total		909	619	68,108	.68	75
	Reproduction	1910-39	3,644	2,978	82,164	.82	23
	Stream (2)		184	362	14,170	1.97	77
Third	Total		3,828	3,340	96,334	.87	25
	Cutover	1920-39	361	682	26,123	1.89	72
	Reproduction	1910-39	511	770	40,464	1.51	79
All Workings	Pole		358	277	8,782	.77	25
	Mature		71	45	1,140	.63	16
	Stream (3)		77	157	5,350	2.04	69
All Workings	Total		1,378	1,931	81,859	1.40	59
	Cutover	1940-44	142	213	56,800	1.50	400
	Cutover	1920-39	361	682	26,123	1.89	72
All Workings	Reproduction	1910-39	4,922	4,097	131,906	.83	27
	Pole		358	277	8,782	.77	25
	Mature		71	45	1,140	.63	16
All Workings	Stream (4)		261	576	21,550	2.21	83
	Total		6,115	5,890	246,301	.96	40

Chemical work included above:

	Acree	Man-Days	Gallons Spray
(1)		57	203
(2)	184	362	1,417
(3)	77	157	535
(4)	261	576	2,155

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
COEUR D'ALENE OPERATION

State	Working	Acree Worked By Forest Service		
		National Forest	Private	Total
Idaho	First	909		909
	Second	3,719	109	3,828
	Third	1,378		1,378
	Total	6,006	109	6,115

TABLE 5

RIBES SPECIES ERADICATED, 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Acres	Ribes Species		Total Ribes
			Ribes lacustre	Ribes viscosissimum	
First	Cutover (1940-44)	142	14,200	42,600	56,800
	Reproduction (1910-39)	767	8,156	1,122	9,278
	Stream		2,030		2,030
Second	All Types	909	24,386	43,722	68,108
	Reproduction (1910-39)	3,644	58,572	23,592	82,164
	Stream	184	14,170		14,170
Third	All Types	3,828	72,742	23,592	96,334
	Cutover (1920-39)	361	24,232	1,891	26,123
	Reproduction (1910-39)	511	31,676	8,788	40,464
All Workings	Pole	358	7,689	1,093	8,782
	Mature	71	1,138	2	1,140
	Stream	77	5,350		5,350
All Workings	All Types	1,378	70,085	11,774	81,859
	Cutover (1940-44)	142	14,200	42,600	56,800
	Cutover (1920-39)	361	24,232	1,891	26,123
All Workings	Reproduction (1910-39)	4,922	98,404	33,502	131,906
	Pole	358	7,689	1,093	8,782
	Mature	71	1,138	2	1,140
All Workings	Stream	261	21,550		21,550
	All Types	6,115	167,213	79,088	246,301



TABLE 6

SUMMARY OF RIBES ERADICATION, 1927 - 1947
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1945-49	715	403	9,547	.56	13	715	
	Burn	1940-44	716	351	53,652	.49	75	716	246
	Plantation	1940-44	992	1,920	465,201	1.94	469	992	227
	Cutover	1940-44	317	332	61,865	1.05	195	317	10,451
	Cutover	1920-39	16,420	21,569	5,382,455	1.31	328	16,420	19,189
	Reproduction	1910-39	90,564	139,751	20,726,827	1.54	229	88,741	9,945
	Pole		65,893	31,279	4,482,605	.47	68	65,157	9,538
	Mature		141,096	87,729	13,798,358	.62	98	123,079	7,390
	Miscellaneous		13,333	16,695	2,965,945	1.25	222	12,909	304
	Stream (1)		14,875	57,829	11,824,163	3.89	795	14,767	2,648
	Total		344,921	357,858	59,770,618	1.04	173	323,813	59,938
Second	Plantation	1940-44	618	1,529	130,960	2.47	212	618	
	Cutover	1920-39	9,399	13,368	1,969,695	1.42	210	9,389	
	Reproduction	1910-39	22,042	33,921	2,002,579	1.54	91	21,309	
	Pole		4,841	3,136	487,525	.65	101	4,841	
	Mature		10,182	8,117	813,461	.80	80	9,982	
	Miscellaneous		1,585	2,963	358,052	1.87	226	1,585	
	Stream (2)		7,997	14,649	1,582,972	1.83	193	7,879	
	Total		56,644	77,683	7,345,244	1.37	130	55,503	
	Plantation	1940-44	513	919	51,175	1.79	100	513	
	Cutover	1920-39	4,686	8,656	424,841	1.85	91	4,686	
	Reproduction	1910-39	5,004	7,986	310,739	1.60	62	4,397	
Third	Pole		1,184	1,073	72,865	.91	62	1,184	
	Mature		1,924	1,418	78,521	.74	41	1,924	
	Miscellaneous		61	72	3,569	1.18	59	61	
	Stream (3)		1,714	2,972	147,366	1.73	86	1,714	
	Total		15,086	23,096	1,089,076	1.53	72	14,479	
	Plantation	1945-49	715	403	9,547	.56	13	715	
	Burn	1940-44	716	351	53,652	.49	75	716	
	Plantation	1940-44	2,123	4,368	647,336	2.06	305	2,123	
	Cutover	1940-44	317	332	61,865	1.05	195	317	
	Cutover	1920-39	30,495	43,593	7,776,991	1.43	255	30,495	
	Reproduction	1910-39	117,610	181,658	23,040,145	1.54	196	114,447	
All Workings	Pole		71,918	35,488	5,042,995	.49	70	71,182	
	Mature		153,202	97,264	14,690,340	.63	96	134,885	
	Miscellaneous		14,979	19,730	3,327,566	1.32	222	14,555	
	Stream (4)		24,576	75,450	13,554,501	3.07	552	24,360	
	Total		416,651	458,637	68,204,938	1.10	164	393,795	

Chemical work included above:

	Acres	Man-Days	Gallons Sprey
(1)		57	203
(2)	184	362	1,417
(3)	77	157	535
(4)	261	576	2,155

TABLE 7

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1927-1947
COEUR D'ALENE OPERATION

State	Class	Acres	Man-Days	Ribes	Per Acre	
					Man-Days	Ribes
Idaho	EQ-Reg.	25,776	8,351	2,846,383	.32	110
	EQ-Emerg.	41,039	35,541	6,589,217	.87	161
	FS-Reg.*	89,854	107,846	15,003,706	1.20	167
	FS-Emerg.	111,711	86,897	17,620,173	.78	158
	CCC	148,271	220,002	26,145,459	1.48	176
	Total	416,651	458,637	68,204,938	1.10	164

*Includes 81 acres, 78 man-days, and 7,110 ribes of contract work.

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1927-1947
COEUR D' ALENE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	307,669	53,150	14,350	375,169	52,987	360,656
	State	5,427	440	45	5,912	711	6,133
	Private	10,717	1,913	84	12,714	6,240	16,957
	Subtotal Other	16,144	2,353	129	18,626	6,951	23,095
	Total	323,813	55,503	14,479	393,795	59,938	383,751



BLISTER RUST CONTROL WORK, KANIKSU OPERATION, 1947

By

H. A. Brischle, Operation Supervisor
Kermit Miller, Forester, U. S. Forest Service

INTRODUCTION

The Kaniksu operation is composed of approximately 600,000 acres of valuable white pine stands and high priority white pine sites located in Bonner and Boundary Counties in northern Idaho and Pend Oreille County in northeastern Washington. The Forest Service and the Priest Lake Timber Protective Association are the principal administering agencies operating within the boundaries of the control area.

The control program consisted of five camps administered by the Bureau of Entomology and Plant Quarantine and six by the Forest Service. The control work was performed on areas of high priority white pine pole, reproduction, plantations, and areas recently logged. Power spray equipment and chemicals were used to good advantage on ribes eradication for the first time on this operation.

Experienced supervisors were available for all camps. More experienced and older men including many college students were employed as workers. This resulted in a minimum turnover of personnel during the season.

The first ribes eradication was done at Forest Service Camp 453 located near Ione, Washington, on May 7, and Bureau Camp 401 located on Pack River near Samuels, Idaho, on May 12. Shortage of funds necessitated the closing of all Bureau camps by August 20. Forest Service camps were closed by September 15. All areas on which work was started were completed and checked.

During the season a total of 12,545 acres were worked by Bureau crews of which 4,192 were initial and 8,353 were second and third working. Forest Service crews worked a total of 15,913 acres of which 4,301 were initial work and 11,612 second and third working. As a result of the season's work 19,580 acres or 69 per cent was classed on maintenance, 6,406 acres or 22 per cent will require a post check, and 2,472 acres or 9 per cent of the areas worked will require further work to place them on maintenance. The latest compilation shows 167,748 acres or 27 per cent of the control area on maintenance. This is an increase of 4 per cent over last year.

Extensive observations made during the last year indicate there have been no years of heavy pine infection since 1941. The infection appearing on ribes during the late summer was comparatively light.

ORGANIZATION AND ADMINISTRATION

Blister rust control work on the Kaniksu operation was administered in accordance with the cooperative working agreement between the Bureau of Entomology and Plant Quarantine and the Forest Service. Full responsibility for the administration of the regular Forest Service camps came within the jurisdiction of the Forest Service personnel. Technical advice, training assistance, and supervision of the checkers was afforded by the Bureau of Entomology and Plant Quarantine personnel. All phases of the work on state, private, and intermingled federal lands were administered by the Bureau of Entomology and Plant Quarantine personnel.

The organization on the project was as follows:

Bureau of Entomology and Plant Quarantine

U. S. Forest Service

H. A. Brischle, Operation Supervisor
L. J. Easley, Unit Supervisor
S. S. Evans, Unit Supervisor
G. M. Houghton, Checking Supervisor

Kermit Miller, Forest Officer
M. C. Aaberg, Unit Supervisor
N. C. Perring, Unit Supervisor

<u>Program</u>	<u>Number of Camps</u>	<u>Number Workers</u>	<u>Number Checkers</u>
FS-Regular	6	240	6
EQ-Cooperative	5	285	6

METHODS AND EQUIPMENT

Before the camps opened a 2-day training school was held for all supervisory personnel. A complete review of methods, safety, and personnel training was presented and discussed.

Chemical methods of ribes eradication were used for the first time on the operation. A truck-mounted high pressure sprayer was used to good advantage on areas near roads. In the more inaccessible places a two-man portable power pump was carried into the areas. Back pack sprayers were used to advantage where ribes were too scattered for efficient use of power equipment. Ammonium sulfamate was the only chemical used.

Several one-man crews were used to good advantage on areas of light ribes concentrations and good visibility. An able crewman working alone was able to take advantage of variable conditions not possible with two or three men working together and thus to speed up production without lowering the efficiency of the work.

After the camps were closed two Forest Service seasonal employees undertook to do ribes eradication work on two areas of 76 and 88 acres on a competitive bid contract basis at the rates of \$6.25 and \$6.50 per acre, respectively. The 88 acre area was worked at the rate of .29 man-days per acre. Approximately 11 ribes per acre were removed. The final check showed one ribes with less than one foot of live stem per acre remaining. The 76 acre area was worked at the rate of .41 man-days per acre. Twenty ribes per acre were removed. The final check showed one ribes with three feet of live stem per acre remaining. Four workings were performed by the contractors on portions of both areas before they were approved as meeting contract specifications.

CHECKING

The checking organization was composed of six checkers paid from Forest Service and five from Bureau funds. Included in this number were one senior checker from the Forest Service and one checker foreman from the Bureau.

All current season work was checked. In addition to the regular check, 5,580 acres of post check were completed and classified as 2,620 acres of maintenance and 2,960 acres in need of rework.

Most of the areas were checked by the checker flanker method. All of the ribes found were recorded as on regular check. At least 10 per cent of the ground was covered where this method was employed, and it afforded a means of locating scattered ribes.

DESCRIPTION AND LOCATION OF WORK AREAS

Bureau Camps 401, 402, and 403. Located in the Pack River and Grouse Creek drainages near Samuels, Idaho. Within these drainages are some of northern Idaho's best white pine sites. Work was in high priority white pine pole and reproduction stands that have become established following a succession of burns after logging. Eighty-two per cent of the 7,243 acres worked by the crews in these camps has been classified as on maintenance, 785 acres or 11 per cent will require a post check, and 480 acres or 1 per cent will need a rework.

Bureau Camp 404. Located on the Middle Fork of East River. Work was in stream type and in stands of pole pine which became established on an 1888 clean second burn. The area was first worked in 1937. After a final check, 2,802 acres or 90 per cent of the acres worked were placed on maintenance, 200 acres on post check and 40 acres on rework.

Bureau Camp 405. Located on Ruby Creek, a tributary of the Upper Priest River. All work was in young white pine pole and reproduction stands, except for a small amount in protection zone in mature type along the river. After the final check 2,707 acres were placed on maintenance and 380 acres on post check.

Forest Service Camp 400. Located at Blister Rust Headquarters on Kalispell Bay. This crew worked stream type along Granite Creek and its tributaries to protect adjacent pole and reproduction areas. The final check showed that 365 acres of pole could be placed on maintenance and 331 acres, largely stream type, would require rework at some future time.

Forest Service Camp 451. Located on Bear Paw Creek, a tributary of the Lower West Branch of Priest River. The area is an excellent stand of white pine pole about 60 years old and was first worked in 1934. A post check made last year showed some light patches of ribes scattered through the upland. As a result of this year's ribes eradication work 1,880 acres or 71 per cent of the area was placed on maintenance and 600 acres or 29 per cent on post check.

Forest Service Camp 452. Located on the Upper West Branch near the High Bridge. This work area consisted of white pine pole, reproduction, recent cutover, and major stream type along the Upper West Branch. The final check showed 1,531 acres or 70 per cent of the area on maintenance, 180 acres of cutover on post check, and 495 acres, largely stream type, on rework.

Forest Service Camp 453. Located on the Big Muddy Creek near Ione, Washington. This area is primarily white pine pole with a small amount of reproduction and cutover. All work in this area was initial. After the final check, 2,359 acres

or 78 per cent was placed on maintenance, 460 acres or 15 per cent on post check and 180 acres or 7 per cent on rework.

Forest Service Camp 454. Located on Kalispell Creek. All work was in stream type and on the plantation area. This was the third working over portions of the plantation where ribes have persisted. After the final check, 2,806 acres were placed on post check and 477 acres on rework; 367 acres in the rework class are in the stream type along Kalispell Creek. Since the area was burned in 1939 it will not be placed on maintenance until a lapse of 15 years.

Forest Service Camp 455. Located on Priest River near the Priest River Experimental Forest. This area consisted of white pine pole, reproduction, cutover, and heavy stream type along the river. Ribes were also eradicated along some of the roads and trails on the Experimental Station area. After the final check it was possible to place 1,958 acres on maintenance, 995 acres on post check, and 385 acres on rework.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs is shown in the following tables by cooperative agency and the type of appropriation:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947 KANIKSU OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 14,479.42
	Regular BLR-3-4	160,179.55
	Subtotal	\$174,658.97
State of Idaho	State BLR-3-4	\$ 3,488.01
Priest Lake Timber Protective Association	Private BLR-3-4	4,066.54
	Subtotal	\$ 7,554.55
Forest Service	Regular BLR-4	\$197,904.64
Total		\$380,118.16

TABLE 2
CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947
KANIKSU OPERATION

Item	Bureau of Entomology and Plant Quarantine			Forest Service	
	Regular BLR-1-4	Regular BLR-3-4	State and Private BLR-3-4	Regular BLR-4	Total
Contract ribes erad.				\$ 846.39	\$ 846.39
Sal. perm. men.	\$14,156.57	\$ 9,685.09		18,450.35	42,292.01
Sal. temp. men.		17,941.79	\$1,003.87	20,305.70	39,251.36
Wages, temp. labs.		54,438.72	6,550.68	91,569.29	152,558.69
Subs. supplies		32,249.59		40,882.20	73,131.79
Equipment		10,671.90		4,911.28	15,583.18
Trucks		14,756.06			14,756.06
Travel & transp.	297.61	5,507.89		9,213.03	15,018.53
Other supplies	25.24	14,928.51		11,726.40	26,680.15
Total	\$14,479.42	\$160,179.55	\$7,554.55	\$197,904.64	\$380,118.16



TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1945-49	743	673	86,819	.91	117
	Cutover	1940-44	331	156	2,262	.47	7
	Cutover	1920-39	127	84	13,645	.66	107
	Reproduction	1910-39	262	92	11,098	.35	42
	Pole		6,297	2,662	298,991	.42	47
	Mature		202	201	25,067	1.00	124
	Miscellaneous		90	106	3,121	1.18	35
	Stream (1)		441	737	104,808	1.67	238
Second	Total		8,493	4,711	545,811	.55	64
	Cutover	1920-39	130	41	442	.32	3
	Reproduction	1910-39	2,552	993	22,827	.39	89
	Pole		9,932	3,702	272,204	.37	27
	Mature		328	115	2,259	.35	7
	Miscellaneous		321	147	3,753	.46	12
	Stream (2)		1,756	2,495	194,918	1.42	111
	Total		15,019	7,493	496,403	.50	33
Third	Plantation	1940-44	1,722	445	12,052	.26	7
	Cutover	1920-39	46	7	84	.15	2
	Reproduction	1910-39	1,785	953	36,862	.53	21
	Pole		752	98	4,023	.13	5
	Mature		270	35	3,639	.13	13
	Miscellaneous		90	99	1,324	1.10	15
	Stream (3)		281	334	7,546	1.19	27
	Total		4,946	1,971	65,530	.40	13
All Workings	Cutover	1945-49	743	673	86,819	.91	117
	Plantation	1940-44	1,722	445	12,052	.26	7
	Cutover	1940-44	331	156	2,262	.47	7
	Cutover	1920-39	303	132	14,171	.44	47
	Reproduction	1910-39	4,599	2,038	70,787	.44	15
	Pole		16,981	6,462	575,218	.38	34
	Mature		800	351	30,965	.44	39
	Miscellaneous		501	352	8,198	.70	16
	Stream (4)		2,478	3,566	307,272	1.44	124
	Total		28,458	14,175	1,107,744	.50	39

Chemical work included above:

	Gallons		
	Acres	Man-Days	Spray
(1)	86	106	3,675
(2)	5	12	110
(3)	47	15	150
(4)	138	133	3,935

TABLE 4

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1947
KANIKSU OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	4,192	2,534	258,495	1,800	.60	62
		FS-Reg.	1,248	655	31,965		.52	26
		Total	5,440	3,189	290,460	1,800	.59	53
	Second	EQ-Coop.	7,631	2,914	290,314		.38	38
		FS-Reg.	4,925	3,306	121,600	110	.67	25
		Total	12,556	6,220	411,914	110	.50	33
	Third	EQ-Coop.	722	401	14,962	150	.56	21
		FS-Reg.	1,090	331	8,203		.30	8
		Total	1,812	732	23,165	150	.40	13
	All Workings	EQ-Coop.	12,545	5,849	563,771	1,950	.47	45
		FS-Reg.	7,263	4,292	161,768	110	.59	22
		Total	19,808	10,141	725,539	2,060	.51	37
Washington	First	FS-Reg.	3,053	1,522	255,351	1,875	.50	84
	Second	FS-Reg.	2,463	1,273	84,489		.52	34
	Third	FS-Reg.	3,134	1,239	42,365		.40	14
	All Workings	FS-Reg.	8,650	4,034	382,205	1,875	.47	44
Total	First	EQ-Coop.	4,192	2,534	258,495	1,800	.60	62
		FS-Reg.	4,301	2,177	287,316	1,875	.51	67
		Total	8,493	4,711	545,811	3,675	.55	64
	Second	EQ-Coop.	7,631	2,914	290,314		.38	38
		FS-Reg.	7,388	4,579	206,089	110	.62	28
		Total	15,019	7,493	496,403	110	.50	33
	Third	EQ-Coop.	722	401	14,962	150	.56	21
		FS-Reg.	4,224	1,570	50,568		.37	12
		Total	4,946	1,971	65,530	150	.40	13
	All Workings	EQ-Coop.	12,545	5,849	563,771	1,950	.47	45
		FS-Reg.	15,913	8,326	543,973	1,985	.52	34
		Total	28,458	14,175	1,107,744	3,935	.50	39



TABLE 5

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
KANIKSU OPERATION

State	Working	Acres Worked												
		By Forest Service				By Bureau of Entomology and Plant Quarantine				Total				
		National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	Total
Idaho	First	1,248			1,248	2,956	511	725	4,192	4,204	511	725	1,236	5,440
	Second	3,301	1,290	334	4,925	3,463	2,898	1,280	7,631	6,764	4,178	1,614	5,792	12,556
	Third	1,090			1,090		45	677	722	1,090	45	677	722	1,812
	Total	5,639	1,290	334	7,263	6,419	3,444	2,682	12,545	12,058	4,734	3,016	7,750	19,808
Washington	First	2,893		160	3,053					2,893		160	160	3,053
	Second	2,169	80	214	2,463					2,169	80	214	294	2,463
	Third	3,024		110	3,134					3,024		110	110	3,134
	Total	8,086	80	484	8,650					8,086	80	484	564	8,650
Total	First	4,141		160	4,301	2,956	511	725	4,192	7,097	511	885	1,396	8,493
	Second	5,470	1,370	548	7,388	3,463	2,898	1,280	7,631	8,933	4,258	1,828	6,086	15,019
	Third	4,114		110	4,224		45	677	722	4,114	45	787	832	4,946
	Total	13,725	1,370	818	15,913	6,419	3,444	2,682	12,545	20,144	4,814	3,500	8,314	28,458

TABLE 6

RIBES SPECIES ERADICATED, 1947
KANIKSU OPERATION

Working	Eradication Type	Acres	Ribes Species			Total Ribes
			Ribes lacustre	Ribes viscosissimum	Ribes inerme	
First	Cutover (1945-49)	743	54,786	32,033		86,819
	Cutover (1940-44)	331	2,204	19	39	2,262
	Cutover (1920-39)	127	13,645			13,645
	Reproduction (1910-39)	262	669	4,622	5,807	11,098
	Pole	6,297	246,705	48,500	3,786	298,991
	Mature	202	19,697	5,370		25,067
	Miscellaneous	90	1,402	1,719		3,121
	Stream	441	80,490	9,297	15,021	104,808
	All Types	8,493	419,598	101,560	24,653	545,811
Second	Cutover (1920-39)	130	379	63		442
	Reproduction (1910-39)	2,552	14,705	3,962	4,160	22,827
	Pole	9,932	215,157	54,093	2,954	272,204
	Mature	328	2,247	12		2,259
	Miscellaneous	321	2,263	1,155	335	3,753
	Stream	1,756	175,750	445	18,723	194,918
	All Types	15,019	410,501	59,730	26,172	496,403
Third	Plantation (1940-44)	1,722	3,073	8,979		12,052
	Cutover (1920-39)	46	62	22		84
	Reproduction (1910-39)	1,785	17,561	19,301		36,862
	Pole	752	2,595	868	560	4,023
	Mature	270	3,025	614		3,639
	Miscellaneous	90	1,088	236		1,324
	Stream	281	6,533	885	128	7,546
	All Types	4,946	33,937	30,905	688	65,530
All Workings	Cutover (1945-49)	743	54,786	32,033		86,819
	Plantation (1940-44)	1,722	3,073	8,979		12,052
	Cutover (1940-44)	331	2,204	19	39	2,262
	Cutover (1920-39)	303	14,086	85		14,171
	Reproduction (1910-39)	4,599	32,935	27,885	9,967	70,787
	Pole	16,981	464,457	103,461	7,300	575,218
	Mature	800	24,969	5,996		30,965
	Miscellaneous	501	4,753	3,110	335	8,198
	Stream	2,478	262,773	10,627	33,872	307,272
	All Types	28,458	864,036	192,195	51,513	1,107,744



TABLE 7

SUMMARY OF RIBES ERADICATION, 1923 - 1947
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	30	17	1,598	.57	53	30	473
	Cutover	1945-49	743	673	86,819	.91	117	743	7,757
	Burn	1940-44	210	184	47,333	.88	225	210	
	Plantation	1940-44	2,631	1,317	490,404	.50	186	2,631	
	Cutover	1940-44	4,062	3,060	536,925	.75	132	4,062	36,472
	Cutover	1920-39	12,097	8,797	1,857,587	.73	154	11,523	24,456
	Reproduction	1910-39	166,180	119,157	32,766,760	.72	197	159,561	25,533
	Pole		129,756	45,706	6,351,703	.35	49	128,441	24,067
	Mature		142,700	30,822	5,824,169	.22	41	110,405	39,370
	Miscellaneous		7,397	5,011	1,995,603	.68	270	6,024	1,277
	Stream (1)		22,923	50,270	9,387,166	2.19	410	22,279	6,893
	Total		488,962	265,562	59,457,817	.54	122	446,152	166,298
Second	Plantation	1940-44	2,631	1,435	50,089	.55	19	2,631	
	Cutover	1940-44	352	199	7,107	.57	20	352	
	Cutover	1920-39	6,768	8,879	1,760,274	1.31	260	6,768	
	Reproduction	1910-39	53,014	44,982	5,653,761	.85	107	52,106	
	Pole		37,656	15,966	1,121,811	.42	30	37,656	
	Mature		7,287	4,019	360,005	.55	49	7,287	
	Miscellaneous		1,377	656	47,147	.48	34	1,377	
	Stream (2)		11,593	15,611	1,471,443	1.35	127	11,538	
Third	Total		120,678	91,747	10,471,637	.76	87	119,715	
	Plantation	1940-44	1,933	480	13,310	.25	7	1,933	
	Cutover	1920-39	5,319	4,431	299,643	.83	56	5,319	
	Reproduction	1910-39	17,194	15,950	1,195,800	.93	70	17,194	
	Pole		2,101	580	57,053	.28	27	2,101	
	Mature		1,170	642	105,910	.55	91	1,170	
	Miscellaneous		637	288	5,587	.45	9	637	
	Stream (3)		1,463	1,874	75,680	1.28	52	1,463	
All Workings	Total		29,817	24,245	1,752,983	.81	59	29,817	
	Burn	1945-49	243	548	111,750	2.26	460	243	
	Plantation	1945-49	30	17	1,598	.57	53	30	
	Cutover	1945-49	743	673	86,819	.91	117	743	
	Burn	1940-44	210	184	47,333	.88	225	210	
	Plantation	1940-44	7,195	3,232	553,803	.45	77	7,195	
	Cutover	1940-44	4,414	3,259	544,032	.74	123	4,414	
	Cutover	1920-39	24,184	22,107	3,917,504	.91	162	23,610	
	Reproduction	1910-39	236,388	180,089	39,616,321	.76	168	228,861	
	Pole		169,513	62,252	7,530,567	.37	44	168,198	
	Mature		151,157	35,483	6,290,084	.23	42	118,862	
	Miscellaneous		9,401	5,955	2,048,337	.63	218	8,038	
	Stream (4)		35,979	67,755	10,934,289	1.88	304	35,280	
	Total		639,457	381,554	71,682,437	.60	112	595,684	

Chemical work included above:

	Gallons	
	Acres	Man-Days
	Spray	
(1)	86	106
(2)	5	12
(3)	47	15
(4)	138	133
		3,935



TABLE 8

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923 - 1947
KANIKSU OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	158,195	62,726	11,728,650	1,950	.40	74
	EQ-Emerg.	99,041	68,851	11,333,497		.70	114
	FS-Reg.	50,070	46,072	5,069,835	110	.92	101
	FS-Emerg.	99,269	38,823	8,788,474		.39	89
	CCC	62,419	50,478	8,451,835		.81	135
	Total	487,790	273,794	46,438,980	2,060	.56	95
Washington	EQ-Emerg.	31,629	19,288	6,754,071		.61	214
	FS-Reg.	61,344	49,381	10,988,893	1,875	.80	179
	FS-Emerg.	36,366	14,386	4,013,260		.40	110
	CCC	22,328	24,705	3,487,233		1.11	156
Total	Total	151,667	107,760	25,243,457	1,875	.71	166
	EQ-Reg.	18,796	6,844	1,066,689		.36	57
	EQ-Coop.	158,195	62,726	11,728,650	1,950	.40	74
	EQ-Emerg.	130,670	88,139	18,087,568		.67	138
	FS-Reg.	111,414	95,453	16,058,728	1,985	.86	144
	FS-Emerg.	135,635	53,209	12,801,734		.39	94
	CCC	84,747	75,183	11,939,068		.89	141
	Total	639,457	381,554	71,682,437	3,935	.60	112

TABLE 9

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923 - 1947
KANIKSU OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Idaho	National Forest	180,127	45,445	4,685	230,257	55,582	235,709
	Public Domain	54			54	80	134
	Subtotal Federal	180,181	45,445	4,685	230,311	55,662	235,843
	State	103,774	27,740	11,773	143,287	31,263	135,037
	Private	66,065	15,525	3,005	84,595	44,022	110,087
	Subtotal Other	169,839	43,265	14,778	227,882	75,285	245,124
	Total	350,020	88,710	19,463	458,193	130,947	480,967
Washington	National Forest	88,940	29,161	10,052	128,153	31,708	120,648
	State	2,080	80		2,160		2,080
	Private	5,112	1,764	302	7,178	3,643	8,755
	Subtotal Other	7,192	1,844	302	9,338	3,643	10,835
	Total	96,132	31,005	10,354	137,491	35,351	131,483
Total	National Forest	269,067	74,606	14,737	358,410	87,290	356,357
	Public Domain	54			54	80	134
	Subtotal Federal	269,121	74,606	14,737	358,464	87,370	356,491
	State	105,854	27,820	11,773	145,447	31,263	137,117
	Private	71,177	17,289	3,307	91,773	47,665	118,842
	Subtotal Other	177,031	45,109	15,080	237,220	78,928	255,959
	Total	446,152	119,715	29,817	595,684	166,298	612,450



BLISTER RUST CONTROL WORK, MONTANA OPERATION, 1947

By

A. S. Skoglund, Operation Supervisor
R. E. Frey, Forester, Cabinet National Forest
M. D. Oaks, Forester, Kootenai National Forest

INTRODUCTION

Blister rust control was conducted on the Cabinet and Kootenai National Forests of the Montana operation. A total of 4,130 acres was worked in 1947 which brings the net progress to 137,368 acres initially worked and 18,591 acres reworked. Approximately 70,685 acres remain to be initially worked.

In most cases a higher type of labor was employed than in the past several years. The many college students recruited from all over the country helped to advance the standards of crew work.

In the Kootenai Forest during the month of August the personnel was engaged chiefly in fire control work.

ORGANIZATION AND ADMINISTRATION

The Forest Service was responsible for the administration and maintenance of the camps and technical supervision was provided by the Bureau of Entomology and Plant Quarantine. The field organization was as follows:

Bureau of Entomology and Plant Quarantine

A. S. Skoglund, Operation Supervisor

U. S. Forest Service

Cabinet Forest

N. D. Fullerton, Forest Officer
R. E. Frey, Forest Officer
C. W. Gustafson, Forest Officer

Kootenai Forest

H. E. Ahlskog, Forest Officer
M. D. Oaks, Forest Officer

Two camps were operated in the Cabinet Forest with a peak of 90 employees. The first camp was established at Rainy Creek on May 21 and closed September 12. The second camp was located on upper Big Creek from June 16 to August 29.

Three camps were operated in the Kootenai Forest with a peak of 100 employees. The first camp was established on Grizzly Creek on June 2. The second camp was located on upper Burnt Creek on June 6. The third camp was established at Sylvanite Ranger Station on June 17. All camps closed during the latter part of August.

LOCATION AND DESCRIPTION OF AREAS

In the Cabinet Forest all work was performed in the St. Regis River drainage. The work in Rainy Creek was an extension of that started in 1945 and continued in 1946. Five species of ribes in varying amounts were encountered in this

area. This area was burned in 1910, logged thereafter, and planted in 1915. It is a very good site for the growth of white pine.

Rework was accomplished in the upper Big Creek basin on lands burned over in 1910. Working conditions were relatively heavy due to considerable brush.

Periodic maintenance work was performed in early spring around Savenac Nursery. Only one to two ribs per acre were found and were usually the result of germination of seed washed in during flood periods.

Work in the Kootenai Forest was performed in the vicinity of Sylvanite Ranger Station. First working was completed on the pole stands in Burnt Creek. In this stand 45-year-old trees measured 15 inches d.b.h. Spray work with ammonium sulfamate was performed on the heavy Ribes inerme patches on the Yaak River. Also rework was done on the stream type areas worked in 1935.

A small amount of rework was performed in the stream type and stream zones on Cyclone Creek. This area consists of a very thrifty stand of 50-year-old pole white pine.

METHODS AND EQUIPMENT

Special emphasis was placed on training in order to bring the workers into production as soon as possible.

Extensive use of chemicals was a high light in 1947 operations. In hand pulling work all troublesome ribs were decapitated and treated with Ammate or 2,4-D, depending on species and location of plant. Each crew in addition to regular ribs picks, carried a supply of Ammate, pruning shears and a bottle of 2,4-D with a brush applicator.

Several types of equipment were used to apply chemical in liquid form. A Hardie orchard sprayer mounted on a 1½-ton chassis was used to spray heavy concentrations of ribs on the streams adjacent to roads. A portable power sprayer was used in places impossible to reach by truck. A back pack-type mist maker was used with a concentrated 2,4-D liquid to treat R. petiolare. In the back country, Ammate was applied to R. lacustre with the regular knapsack sprayer.

CONTROL STATUS

In the Cabinet Forest a total of 42,442 acres is now on a maintenance basis. This represents about 53 per cent of the worked area. Only 363 acres were added as a result of this season's work.

Another 11,000 acres or about 14 per cent are classified as being on post check. In the stream type adjacent to Savenac Nursery, a total of 225 acres containing less than two ribs per acre was worked at the rate of seven acres per man-day. This acreage is being carried in a post check category, as stream type is considered a permanent ribs site. In the St. Regis River drainage, several areas on maintenance were examined and in all cases the classification was correct.

In Savenac Nursery an examination of 10,000 seedlings failed to disclose any blister rust. No rust was found in an examination of 8,500 specimens of 2-1 transplant stock. In the old part of the nursery, less than .1 per cent infection was found on 13,500 specimens of 2-3 transplant stock. Similar findings in the past three years indicate that the most important source of the serious infection in the nursery during 1940-1943 was eliminated with the eradication of ribes under Hagan Lookout. A post check on the lookout area shows less than 25 feet of ribes live stem per acre remaining after working in 1942 and 1945.

In Rainy Creek a high percentage of pine infection is present as a result of the delay in completing the work. A small amount of initial work still remains. The area contains a good stocking of white pine on an excellent site but the progress of the rust during the next few years will largely determine how much volume will be left at maturity.

An advance survey was run on White Pine Creek in anticipation of initial work being performed next year. The area contains some thrifty plantings on a double burn. It should be worked at a nominal cost as the ribes are very light over most of the area. Only a few cankers were found and these were located near the junction of two large streams.

A post check on the south fork of Marten Creek substantiated an older regular check in showing ribes only on the south-facing slopes of the side draws. Pine infection, of 1941 origin, is relatively light and is confined mainly to the area along the main stream.

On the west fork of Marten Creek some damage from armillaria was observed in the young white pine.

In the Kootenai Forest there are nearly 10,000 acres of cutover with a good portion in need of initial work.

Barron Creek was logged in 1943 leaving a residual of young reproduction and pole for the next cut. Few upland ribes are noted on the area and these are confined largely to skid trails and landings. However, numerous ribes are found along the stream and these should be sprayed next season to prevent re-seeding.

Keeler Creek was cut over in 1941 to 1947. In the lower portion of the drainage, considerable restocking has taken place. This portion of the area should be initially worked next season to prevent any rust build-up in the area. Stand improvement work is now being performed on some portions of the drainage but control work on these areas should be deferred for several years.

An examination of the pine on the south fork of Callahan Creek discloses some infection along the stream type. Rework should be performed on this area and initial work extended up the right-hand fork.

A total of 32,111 acres is now on a maintenance basis in the Kootenai Forest. The sum of 1,801 acres or 61 per cent of area worked this year was added as a result of 1947 work.

A large portion of this season's maintenance area was contained within the Burnt Creek drainage. However, some of the work done in Grizzly branch was not up to standard, consequently rust conditions should be carefully watched. A light re-spray next season of the main Burnt Creek stream type should suppress all new seedlings and resprouts for a considerable time.

The work performed this season on Cyclone Creek should be adequate for the protection of this stand. A few old cankers were observed but no recent ones were found. This pole stand is closing in rapidly to preclude the establishment of new ribes.

STATEMENT OF EXPENDITURES AND COSTS

The statement of expenditures and costs by cooperative agency and type of appropriation is shown in the following tabulations:

TABLE 1

EXPENDITURES BY APPROPRIATIONS, CALENDAR YEAR 1947 MONTANA OPERATION

Cooperating Agency	Appropriation	Amount
Bureau of Entomology and Plant Quarantine	Regular BLR-1-4	\$ 2,600.61
Cabinet National Forest	Regular BLR-4	58,888.00
Kootenai National Forest	Regular BLR-4	82,702.53
Total		\$144,191.14

TABLE 2

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947 MONTANA OPERATION

Item	Bureau of Entomology and Plant Quarantine	Cabinet National Forest	Kootenai National Forest	Total
	Regular BLR-1-4	Regular BLR-4	Regular BLR-4	
Salaries & wages	\$2,280.19	\$40,243.00	\$59,647.29	\$102,170.48
Subs. supplies		13,208.00	10,172.65	23,380.65
Equipment		3,165.00	1,753.62	4,918.62
Travel & transp.	320.42	924.00	3,895.77	5,140.19
Other supplies		1,348.00	7,233.20	8,581.20
Total	\$2,600.61	\$58,888.00	\$82,702.53	\$144,191.14

TABLE 3

SUMMARY OF RIBES ERADICATION, 1947
MONTANA OPERATION

Forest	Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
							Man-Days	Ribes
Cabinet	First	Reproduction	1910-39	78	47	1,067	.60	14
		Stream (1)			15	24,000		
		Total		78	62	25,067	.79	321
	Second	Reproduction	1910-39	326	1,035	41,528	3.17	127
		Stream (2)		24	108	72,061	4.50	3,003
		Total		350	1,143	113,589	3.27	325
	Third and Other	Reproduction	1910-39	517	1,158	33,652	2.24	65
		Stream (3)		256	80	6,310	.31	25
		Total		773	1,238	39,962	1.60	52
	All Workings	Reproduction	1910-39	921	2,240	76,247	2.43	83
		Stream (4)		280	203	102,371	.73	366
		Total		1,201	2,443	178,618	2.03	149
Kootenai	First	Reproduction	1910-39	219	346	14,098	1.58	64
		Pole		2,124	1,232	102,952	.58	48
		Stream (5)		217	560	85,881	2.58	396
		Total		2,560	2,138	202,931	.84	79
	Second	Pole		86	44	1,229	.51	14
		Stream		283	298	12,458	1.05	44
		Total		369	342	13,687	.93	37
	All Workings	Reproduction	1910-39	219	346	14,098	1.58	64
		Pole		2,210	1,276	104,181	.58	47
		Stream		500	858	98,339	1.72	197
		Total		2,929	2,480	216,618	.85	74
All Forests	First	Reproduction	1910-39	297	393	15,165	1.32	51
		Pole		2,124	1,232	102,952	.58	48
		Stream (6)		217	575	109,881	2.65	506
		Total		2,638	2,200	227,998	.83	86
	Second	Reproduction	1910-39	326	1,035	41,528	3.17	127
		Pole		86	44	1,229	.51	14
		Stream (2)		307	406	84,519	1.32	275
		Total		719	1,485	127,276	2.07	177
	Third and Other	Reproduction	1910-39	517	1,158	33,652	2.24	65
		Stream (3)		256	80	6,310	.31	25
		Total		773	1,238	39,962	1.60	52
	All Workings	Reproduction	1910-39	1,140	2,586	90,345	2.27	79
		Pole		2,210	1,276	104,181	.58	47
		Stream (7)		780	1,061	200,710	1.36	257
		Total		4,130	4,923	395,236	1.19	96

Chemical work included above:

	Acres		Gallons	
	Man-Days	Spray		
(1)	5	15	2,400	
(2)	40	108	6,540	
(3)	31	46	443	
(4)	76	169	9,183	
(5)	130	218	5,913	
(6)	135	233	8,313	
(7)	206	387	15,096	

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1947
MONTANA OPERATION

Forest	Working	Acres Worked By Forest Service			
		National Forest	Public Domain	Private	Total
Cabinet	First	75		3	78
	Second	301	3	46	350
	Third	599		174	773
	Total	975	3	223	1,201
Kootenai	First	2,560			2,560
	Second	199		170	369
	Total	2,759		170	2,929
All Forests	First	2,635		3	2,638
	Second	500	3	216	719
	Third	599		174	773
	Total	3,734	3	393	4,130

TABLE 5
RIBES SPECIES ERADICATED, 1947
MONTANA OPERATION

Forest	Working	Eradication Type	Acres	Ribes Species						Total Ribes
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes irriguum	Ribes triste	
Cabinet	First	Reproduction (1910-39)	78	956	111					1,067
		Stream (1)		4,000	200	12,000	4,000		3,800	24,000
		All Types	78	4,956	311	12,000	4,000		3,800	25,067
	Second	Reproduction (1910-39)	326	39,510	1,971	47				41,528
		Stream (2)	24	10,249	22	38,537	10,413		12,840	72,061
		All Types	350	49,759	1,993	38,584	10,413		12,840	113,589
	Third and Other	Reproduction (1910-39)	517	31,243	2,195	15			199	33,652
		Stream (3)	256	2,943		1,528	831		1,008	6,310
		All Types	773	34,186	2,195	1,543	831		1,207	39,962
	All Workings	Reproduction (1910-39)	921	71,709	4,277	62			199	76,247
		Stream (4)	280	17,192	222	52,065	15,244		17,648	102,371
		All Types	1,201	88,901	4,499	52,127	15,244		17,847	178,618
Kootenai	First	Reproduction (1910-39)	219	9,709	3,872			517		14,098
		Pole	2,124	89,262	13,603			87		102,952
		Stream (5)	217	55,433	83		19,022	11,343		85,881
		All Types	2,560	154,404	17,558		19,022	11,947		202,931
	Second	Pole	86	1,056	173					1,229
		Stream	283	11,875	15		415	153		12,458
		All Types	369	12,931	188		415	153		13,687
	All Workings	Reproduction (1910-39)	219	9,709	3,872			517		14,098
		Pole	2,210	90,318	13,776			87		104,181
		Stream	500	67,308	98		19,437	11,496		98,339
		All Types	2,929	167,335	17,746		19,437	12,100		216,618
All Forests	First	Reproduction (1910-39)	297	10,665	3,983			517		15,165
		Pole	2,124	89,262	13,603			87		102,952
		Stream (6)	217	59,433	283	12,000	23,022	11,343	3,800	109,881
		All Types	2,638	159,360	17,869	12,000	23,022	11,947	3,800	227,998
	Second	Reproduction (1910-39)	326	39,510	1,971	47				41,528
		Pole	86	1,056	173					1,229
		Stream (2)	307	22,124	37	38,537	10,828	153	12,840	84,519
		All Types	719	62,690	2,181	38,584	10,828	153	12,840	127,276
	Third and Other	Reproduction (1910-39)	517	31,243	2,195	15			199	33,652
		Stream (3)	256	2,943		1,528	831		1,008	6,310
	All Workings	All Types	773	34,186	2,195	1,543	831		1,207	39,962
		Reproduction (1910-39)	1,140	81,418	8,149	62		517	199	90,345
		Pole	2,210	90,318	13,776			87		104,181
		Stream (7)	780	84,500	320	52,065	34,681	11,496	17,648	200,710
		All Types	4,130	256,236	22,245	52,127	34,681	12,100	17,847	395,236

Chemical work included above:

Gallons Spray

	Acres	Man-Days	Ammate	2,4-D	Atlacide
(1)	5	15		800	1,600
(2)	40	108	3,075	3,265	
(3)	31	46	355	88	
(4)	76	169	3,430	4,153	1,600
(5)	130	218	5,913		
(6)	135	233	5,913	800	1,600
(7)	206	387	9,343	4,153	1,600



TABLE 6
SUMMARY OF RIBES ERADICATION, 1928-1947
MONTANA OPERATION

Forest	Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
							Man-Days	Ribes	Worked	Unworked
Cabinet	First	Reproduction	1910-39	35,509	36,850	6,421,918	1.04	181	34,940	6,136
		Pole		25,959	9,213	1,745,885	.35	67	25,670	7,134
		Mature		9,377	4,457	1,064,702	.43	114	9,357	1,712
		Miscellaneous		4,900	2,230	596,499	.46	122	4,657	
		Stream (1)		5,039	16,113	3,650,108	3.20	724	5,039	
		Total		80,784	68,863	13,479,112	.85	167	79,663	14,982
	Second	Reproduction	1910-39	5,968	9,625	844,355	1.61	141	5,968	
		Pole		1,108	1,423	101,767	1.28	92	1,108	
		Mature		28	27	1,799	.96	64	28	
		Miscellaneous		33	34	1,503	1.03	46	33	
		Stream (2)		3,018	5,521	634,459	1.83	210	3,018	
		Total		10,155	16,630	1,583,883	1.64	156	10,155	
	Third and Other	Reproduction	1910-39	2,139	2,534	124,201	1.18	58	2,139	
		Pole		125	149	7,256	1.19	58	125	
		Stream (3)		3,250	3,922	193,635	1.21	60	3,250	
		Total		5,514	6,605	325,092	1.20	59	5,514	
	All Workings	Reproduction	1910-39	43,616	49,009	7,390,474	1.12	169	43,047	
		Pole		27,192	10,785	1,854,908	.40	68	26,903	
		Mature		9,405	4,484	1,066,501	.43	113	9,385	
		Miscellaneous		4,933	2,264	598,002	.46	121	4,690	
		Stream (4)		11,307	25,556	4,478,202	2.26	396	11,307	
		Total		96,453	92,098	15,398,087	.95	160	95,332	
Kootenai	First	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1945-49							80
		Cutover	1940-44							5,739
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	3,761
		Reproduction	1910-39	13,803	9,193	1,095,289	.67	79	13,069	9,718
		Pole		23,926	10,721	1,031,320	.45	43	23,014	19,876
		Mature		17,172	4,377	594,415	.25	35	16,167	16,529
		Miscellaneous		346	95	7,956	.27	23	346	
		Stream (5)		3,929	12,362	1,572,080	3.15	400	3,701	
		Total		60,584	37,632	4,357,459	.62	72	57,705	55,703
	Second	Reproduction	1910-39	716	367	30,680	.51	43	716	
		Pole		1,229	1,162	56,347	.95	46	1,229	
		Stream		1,050	2,209	111,980	2.10	107	822	
		Total		2,995	3,738	199,007	1.25	66	2,767	
	Third and Other	Pole		133	276	10,360	2.08	78	133	
		Stream		22	14	758	.64	34	22	
		Total		155	290	11,098	1.87	72	155	
	All Workings	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	
		Reproduction	1910-39	14,519	9,560	1,125,969	.66	78	13,785	
		Pole		25,288	12,159	1,098,027	.48	43	24,376	
		Mature		17,172	4,377	594,415	.25	35	16,167	
		Miscellaneous		346	95	7,956	.27	23	346	
		Stream (5)		5,001	14,585	1,684,798	2.92	337	4,545	
		Total		63,734	41,660	4,567,564	.65	72	60,627	
All Forests	First	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1945-49							80
		Cutover	1940-44							5,739
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	3,761
		Reproduction	1910-39	49,312	46,043	7,517,207	.93	152	48,009	15,854
		Pole		49,885	19,934	2,777,205	.40	56	48,684	27,010
		Mature		26,549	8,834	1,659,117	.33	62	25,524	18,241
		Miscellaneous		5,246	2,325	604,455	.44	115	5,003	
		Stream (6)		8,968	28,475	5,222,188	3.18	582	8,740	
		Total		141,368	106,495	17,836,571	.75	126	137,368	70,685
	Second	Reproduction	1910-39	6,684	9,992	875,035	1.49	131	6,684	
		Pole		2,337	2,585	158,114	1.11	68	2,337	
		Mature		28	27	1,799	.96	64	28	
		Miscellaneous		33	34	1,503	1.03	46	33	
		Stream (2)		4,068	7,730	746,439	1.90	183	3,840	
		Total		13,150	20,368	1,782,890	1.55	136	12,922	
	Third and Other	Reproduction	1910-39	2,139	2,534	124,201	1.18	58	2,139	
		Pole		258	425	17,616	1.65	68	258	
		Stream (3)		3,272	3,936	194,373	1.20	59	3,272	
		Total		5,669	6,895	336,190	1.22	59	5,669	
	All Workings	Plantation	1945-49	244	125	5,462	.51	22	244	
		Cutover	1920-39	1,164	759	50,937	.65	44	1,164	
		Reproduction	1910-39	58,135	58,569	8,516,443	1.01	146	56,832	
		Pole		52,480	22,944	2,952,935	.44	56	51,279	
		Mature		26,577	8,861	1,660,916	.33	62	25,552	
		Miscellaneous		5,279	2,359	605,958	.45	115	5,036	
		Stream (7)		16,308	40,141	6,163,000	2.46	378	15,852	
		Total		160,187	133,758	19,955,651	.84	125	155,959	

Chemical work included above:

	Acres	Man-Days	Gallons Sprey
(1)	722	1,999	61,090
(2)	222	496	17,761
(3)	68	269	4,623
(4)	1,012	2,764	83,474
(5)	130	218	5,913
(6)	852	2,217	67,003
(7)	1,142	2,982	89,387



TABLE 7

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1928-1947
MONTANA OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Reg.	2,002	3,295	761,710	34,795	1.65	380
EQ-Emergency	66,076	30,787	5,775,415	1,330	.47	87
FS-Reg.	41,922	51,616	4,578,794	25,299	1.23	109
FS-Emergency	35,712	35,620	7,367,723	21,638	1.00	206
CCC	14,475	12,440	1,472,009	6,325	.86	102
Total	160,187	133,758	19,955,651	89,387	.84	125

TABLE 8

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1928-1947
MONTANA OPERATION

Forest	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Third	Total		
Cabinet	National Forest	63,051	8,102	3,500	74,653	10,975	74,026
	Public Domain	40	3		43		40
	Subtotal Federal	63,091	8,105	3,500	74,696	10,975	74,066
	State	734	1		735		734
	Private	15,838	2,049	2,014	19,901	4,007	19,845
	Subtotal Other	16,572	2,050	2,014	20,636	4,007	20,579
	Total	79,663	10,155	5,514	95,332	14,982	94,645
Kootenai	National Forest	54,545	2,226	155	56,926	44,685	99,230
	State					173	173
	Private	3,160	541		3,701	10,845	14,005
	Subtotal Other	3,160	541		3,701	11,018	14,178
	Total	57,705	2,767	155	60,627	55,703	113,408
All Forests	National Forest	117,596	10,328	3,655	131,579	55,660	173,256
	Public Domain	40	3		43		40
	Subtotal Federal	117,636	10,331	3,655	131,622	55,660	173,296
	State	734	1		735	173	907
	Private	18,998	2,590	2,014	23,602	14,852	33,850
	Subtotal Other	19,732	2,591	2,014	24,337	15,025	34,757
	Total	137,368	12,922	5,669	155,959	70,685	208,053



BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1947

By

John C. Gynn, Operation Supervisor
Clarence M. Chapman, Pathologist

Ribes eradication work for the control of white pine blister rust on Mount Rainier National Park during 1947 was confined to the White River area as scheduled in the 1944 annual report. The work was accomplished with a crew that varied in size from 18 to 26 men under the direction of one experienced superintendent and one experienced foreman. During the season 2,134 acres were worked with an expenditure of .38 man-days per acre. Most of the work was in the vicinity of Rock Crusher Point on the east end of the area. This ribes area was larger than expected as the 1946 check had not covered the entire control unit. Two slides were found and worked that supported heavy Ribes viscosissimum which may have been the source of some infection at Sunrise Point. From Sunrise Point to the west end of the control area an intensive search was made in and around the scattered clumps of Pinus albicaulis. A number of large infected R. acerifolium were eradicated that had undoubtedly been spreading infection to the white pine. The White River campground area was reworked as originally planned, but additional work will be necessary as outlined below. Of the 2,134 acres worked in 1947, 1,612 acres were placed on maintenance, 315 acres will require a post check, and 207 acres of stream type will be checked or scouted before any future eradication work is done.

Canker elimination work was performed on both the Silver Forest and White River areas during the first few days of the season and during inclement weather. In the Silver Forest, using only eight men supervised by C. M. Chapman, 83 man-days were spent on 46 acres removing 18,960 cankers. On June 23 these men were moved to White River where the balance of the crew reported for regular ribes eradication work. During inclement weather between June 24 and July 7, 128 man-days were devoted to canker elimination work in Sunrise Park, 157,455 cankers being removed. At the White River campground seven man-days were employed removing 490 cankers.

RECOMMENDATIONS

Longmire-Silver Forest. The 1946 check on the Silver Forest area shows that a complete reworking, as estimated in 1944, will be necessary to put this area on a maintenance basis. This check also shows several concentrations of R. bracteosum on Tatoosh Creek and one near Narada Falls. These ribes concentrations should be eliminated in conjunction with the work on the main area. Hormone sprays can be used to eliminate the R. bracteosum at a minimum cost.

Canker elimination work in the Silver Forest area in 1947 covered only 46 acres before the eight men reporting early were moved to White River for regular ribes eradication work. A crew of 10 men should be employed in 1948 to do all necessary canker elimination work in the Silver Forest area.

The following recommendation is made for 1948 for ribes eradication and canker elimination work in the Longmire-Silver Forest area: For a complete 3-month period starting about June 10, a crew composed of 28 laborers, 10 crew leaders,

2 foremen (SP-6), and 1 superintendent (SP-7). It is recommended that 10 more laborers than estimated be hired at the start to take care of losses from quits, discharges, and those leaving early for school.

White River. The 1947 work in the White River area was completed as originally planned. During the year, however, several inspections for ribes were made in the streams and upland areas adjacent to the original control boundaries. Directly across White River, opposite the campground, a heavy concentration of R. bracteosum, R. laxiflorum, R. lacustre, and R. watsonianum was located. Also, just above the present control boundaries on White River and several of its tributaries the same type of ribes concentration was found to exist. Both of these concentrations are in stream type. One upland area, located between the White River campground and Sunrise Park, comprising approximately 200 acres of white pine pole and reproduction (P. monticola), is supporting many R. lacustre. This area has never been worked as it lies between the two control boundaries, but directly adjacent to the Sunrise Park white pine (P. albicaulis) area now on maintenance, and the White River campground (P. monticola) pole area also on maintenance.

These ribes concentrations are less than one mile from P. albicaulis in Sunrise Park and P. monticola in the White River campground, and all are possible sources of infection to the white pine being protected. Ribes should be eliminated from these areas in 1948. The stream type ribes are to be eradicated by the use of chemical sprays and the upland area is to be worked by a combination of hand and chemical methods.

The following recommendation is made for 1948 for the White River area: For a complete 3-month period starting about June 10, a crew of seven laborers, three crew leaders, and one superintendent (SP-7). The superintendent must be experienced in both chemical and hand methods of ribes eradication.

Conclusion. The program recommended for 1948 is designed to complete large-scale blister rust control work in the Park and to place the selected pine areas on as good a protection basis as is economically feasible. If the 1948 program is carried through as recommended, consideration should be given to the employment during the next several field seasons of a four or five-man maintenance crew under the direction of a competent foreman to conduct surveys and to perform canker elimination and ribes eradication work as necessary. The crew could progressively cover the entire control area over a period of years which may be more satisfactory than attempting to maintain control standards with a 30-man crew at periodic intervals.

The above proposals were discussed and met with the approval of officials of the National Park Service, Bureau of Entomology and Plant Quarantine, and Bureau of Plant Industry during a meeting held at Longmire, Washington, August 27-28, 1947.

Experience in Mount Rainier National Park has shown the difficulties of protecting small white pine areas in rugged topography where ribes are numerous and widespread and where frequent fogs of long duration envelop the white pine stands. Under these conditions permanent protection is not feasible by virtue of the longer distance of spread of rust from ribes to pine. Nevertheless, on the White River, Longmire, and Silver Forest areas, experience has demonstrated that control

work, even though behind schedule, can greatly retard the damaging effect of the rust and that a nominal maintenance program can preserve the pine in these areas for many years. Eventually all or most of the pine may be lost, but in the case of P. monticola the pine can be protected sufficiently to permit the climax species to gradually take over the site. Any changes which may occur should take place without the drastic upset in aesthetic values as is the case in the Stevens Canyon and Cowlitz areas where practically unrestricted rust development has caused an extensive unsightly scene of diseased and dying trees which will persist for years. The pine in the White River, Longmire, and Silver Forest areas already has been saved from this sudden destruction and the performance of the recommended control and maintenance work will extend the life of the pine stands many decades.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work and accumulative results of all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947 MOUNT RAINIER NATIONAL PARK

Item	National Park Service
	Regular BLR-5
Personal Services	\$13,369.50
Travel & Transportation	56.74
Contractual Services	954.90
Supplies & Materials	1,494.02
Total	\$15,875.16



TABLE 2

SUMMARY OF RIBES ERADICATION, 1947
MOUNT RAINIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species						Total Ribes	Per Acres	
				Ribes lacustris	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium		Man-Days	Ribes
White River	Third	2,134	805	16,747	7,398	206	1,070	2,144	571	28,136	.38	13

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1930-1947
MOUNT RAINIER NATIONAL PARK

Class	Gross Acres	Net Acres	Man-Days	Total Ribes	Per Acres	
					Man-Days	Ribes
NP-Reg.	10,496	9,677	10,164	977,588	.97	93
NP-CCC	10,960	6,089	12,692	1,293,167	1.16	118
Total	21,446	15,766	22,856	2,270,755	1.07	106

TABLE 4

SUMMARY OF RIBES ERADICATION, 1930-1947
MOUNT RAINIER NATIONAL PARK
(NET CONTROL AREA)

Area	Working	Acres	Man-Days	Ribes Destroyed								Total Ribes	Per Acre	
				Ribes lacustris	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium	Ribes eanguinum	Ribes triste		Man-Days	Ribes
Longmire	First	900	1,599	225,968		98,875		59,308	8,642	16		392,809	1.78	436
	Second	888	797	30,938		24,332		2,394	2,898	50		60,602	.90	68
	Other	2,392	3,754	73,045		19,003		3,846	42,051	15		137,960	1.58	58
	Total	4,170	6,150	329,951		142,210		65,548	53,581	81		591,371	1.47	142
White River	First	2,681	3,145	370,832	84,125	5,429	140,613	10,564	11,228	189	752	623,732	1.17	233
	Second	2,652	2,484	70,531	16,315	2,330	6,941	16,229	4,537			116,883	.94	44
	Other	6,263	2,668	33,837	12,862	433	13,892	2,867	5,759			69,650	.43	11
	Total	11,596	8,297	475,200	113,302	8,192	161,446	29,660	21,524	189	752	810,265	.72	70
All Areas	First	3,581	4,744	596,800	84,125	104,304	140,613	69,872	19,870	205	752	1,016,541	1.32	284
	Second	3,540	3,281	101,469	16,315	26,662	6,941	18,623	7,425	50		177,485	.93	50
	Other	8,645	6,422	106,882	12,862	19,436	13,892	6,713	47,810	15		207,610	.74	24
	Total	15,766	14,447	805,151	113,302	150,402	161,446	95,208	75,105	270	752	1,401,636	.92	89



BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1947

By

John C. Gynn, Operation Supervisor

Clarence M. Chapman, Pathologist

The 1947 blister rust control program included work on East Glacier, Two Medicine, and Oldman Lake areas. The project was efficiently administered and all units were installed as rapidly as available man power and weather permitted. The men hired for ribes eradication work were of high caliber and many will be top material for future supervisors.

East Glacier. Acres worked 446, man-days per acre 1.61, ribes removed per acre 35. Work was started June 24 and the entire area was covered by August 15. The crew consisted of 15 to 20 men under the direction of 1 experienced foreman and 1 experienced superintendent who also assisted with the direction of the Two Medicine job. A preseason check showed that the entire area required reworking. Many old crowns had resprouted and ribes regeneration had occurred along Roes Creek and along the cliffs at the campground perimeter. The grass areas and semistream type bordering St. Mary Lake contained many Ribes inerme and took considerable searching time as all ribes were hidden in the grass and brush. Inclement weather conditions prevented making a final check of the work. This check will be made in 1948. Very light blister rust infection was found on both white pine and ribes along the northeast control boundary.

Two Medicine. Acres worked 707, man-days per acre .86, ribes per acre 92. Work started June 24 and was continued until August 11. This was a 20-man project and was the only one where it was necessary to use a foreman with no previous ribes eradication experience. The crew was trained by an experienced superintendent who later took over the Oldman Lake camp. A four per cent check was made before the work plan was determined. The check showed that many more ribes existed on the west and north sides of the area than were known to be present. The high ribes figure was caused by many seedlings in the stream type and on several small upland cliff areas. A check was made of the worked area late in the season, and it appears that one-third of the upland area will need a reworking by 1950. An additional working should also be performed at that time on the stream type and the several small cliff areas due to the ribes regeneration occurring in those types.

Oldman Lake. Acres worked 680, man-days per acre 1.23, ribes per acre 158. The area is adjacent to Oldman Lake which is eight miles by pack trail from the Two Medicine Ranger Station. Camp construction was completed July 11 at which time the area became free of snow and ribes eradication work was begun. Work continued without interruption until September 6. Camp strength averaged approximately 30 high caliber men supervised by an experienced superintendent and one inexperienced foreman. The area presented many eradication difficulties as extremely heavy ribes existed in the dense brush under part of the mature timber and on the open slopes at the east side of the control area. The area is bounded by cliffs and steep rocky slopes on three sides, much of which supports heavy brush, suppressed pine, and many ribes. These areas are so steep that at least two to three surface acres are worked for every one claimed. The work accomplished was of good quality for initial working on this type of ground. An advance check

map of the area was available showing the location and limits of all heavy ribes concentrations. No regular check was made of 1947 work as the high number of ribes removed would automatically place most of this area in a rework category. All mature and pole types will be checked in 1948 before any reworking is performed, deleting all areas not requiring further work. No infection was found on the west side of the area, but light infection is present on ribes and pine reproduction on the east side. This pine is thrifty and has been closely associated with heavy ribes in ideal conditions for the spread and intensification of the disease. Most of the infection found was of 1941 origin although one canker was of 1938 origin and one of 1939. No control status boundaries will be established until after the 1948 work has been completed as outlined in recommendations for this area. Following the regular check a plan for future control can be made and definite maintenance boundaries plotted.

RECOMMENDATIONS

East Glacier. A thorough check with flankers in 1948 to determine the control status of the area. Any additional work found necessary, to be done in 1950.

Two Medicine. No further work is necessary until 1950, at which time the area should receive a four per cent check with flankers to determine the amount and location of additional work necessary. The estimate made in the 1945 report will probably suffice.

Oldman Lake. In 1948 complete all initial work as follows: 118 acres on the north side of the area. Work the small areas of cliffs, rock ledges and precipitous slopes supporting heavy ribes concentrations on the south and northwest sides of the area. Treat the 60 to 80 acres of heavy ribes at the east control boundary on the south side of Dryfork Creek. If a chemical completely effective on the ribes species involved is not available in 1948, work on this area should be postponed as hand methods would not be economically feasible. After completion of initial work, rework should be started in the white pine reproduction, pole and mature types if the check indicates additional work necessary.

A small canker elimination job is necessary in the white pine reproduction at the east end of the area. Light infection is present and many trees would be saved by this treatment. The immediate infection hazard would also be reduced.

The following recommendation is made for 1948 for the Oldman Lake area: For a complete two and one-half month period starting in late June a crew of 26 men and 1 superintendent with both chemical and hand eradication experience.

Lake McDonald and Snyder Creek Area. On random inspections made in 1947 infected ribes were found in the upland and stream types at the north end of the area. Snyder Creek stream type is supporting ribes seedlings. As most of the Lake McDonald area is on or approaching a maintenance standard a thorough check of the area using the checker flanker method should be made at the beginning of the 1948 season. The 1948 ribes eradication work to be determined from the results of this check.

Park Headquarters. Random inspections made in 1947 located infected ribes within the control area along the river at the Park entrance highway bridge.

Infected ribes were found in the powder house area. Early in 1948 a complete check using the checker flanker method should be made. Only a small amount of ribes eradication work is anticipated as being necessary in 1948. Since the Lake McDonald crew will probably be stationed at Park Headquarters, it would be advisable to utilize this crew for the work on the Headquarters area. This will eliminate the working planned for 1950.

The following recommendation is made for 1948 for the Lake McDonald and Park Headquarters areas: For a complete 3-month period starting about June 10 a crew of 15 men and 1 foreman or superintendent. In order to obtain the complete effective working period it is recommended that 10 more laborers than estimated be hired at the start, to take care of time lost from rain, fire, and crew reductions resulting from quits, discharges, and those leaving early for school.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work and accumulative results for all work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947 GLACIER NATIONAL PARK

Item	National Park Service
	Regular BLR-5
Personal Services	\$34,843.40
Travel & Transportation	188.09
Communication Service	4.87
Other Structural Services	9,663.76
Supplies and Materials	2,012.73
Equipment (includes fixed)	3,923.83
Salary & Expense, Checkers	306.84
Total	\$50,943.52



TABLE 2

SUMMARY OF RIBES ERADICATION, 1947
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum	Ribes inerme		Man-Days	Ribes
Two Medicine	Second	385	382	21,249	1,085	69	75	22,478	.99	58
	Other	322	224	40,958	1,469		140	42,567	.70	132
	Total	707	606	62,207	2,554	69	215	65,045	.86	92
East Glacier	First	58	24	1,753	339	670	980	3,742	.41	65
	Second	302	520	15,618	3,005	21,070	1,114	40,807	1.72	135
	Other	86	174	13,373	578	1,633	275	15,859	2.02	184
	Total	446	718	30,744	3,922	23,373	2,369	60,408	1.61	135
Oldman Lake	First	680	836	107,394	14			107,408	1.23	158
All Areas	First	738	860	109,147	353	670	980	111,150	1.17	151
	Second	687	902	36,867	4,090	21,139	1,189	63,285	1.31	92
	Other	408	398	54,331	2,047	1,633	415	58,426	.98	143
	Total	1,833	2,160	200,345	6,490	23,442	2,584	232,861	1.18	127

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1939-1947
GLACIER NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Per Acre	
				Man-Days	Ribes
NP-Reg.	2,914	3,875	435,589	1.33	149
NP-CCC	2,633	2,833	323,841	1.08	123
NP-CPS	2,776	2,285	214,156	.82	77
Total	8,323	8,993	973,586	1.08	117

TABLE 4

SUMMARY OF RIBES ERADICATION, 1939-1947
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes setosum	Ribes inerme		Man-Days	Ribes
Park Headquarters	First	681	445	32,708	43,176	32,986		108,870	.65	160
	Second	619	201	3,277	2,518	1,195	2	6,992	.32	11
	Other	261	260	2,162	3,678	1,064		6,904	1.00	26
	Total	1,561	906	38,147	49,372	35,245	2	122,766	.58	79
Two Medicine	First	707	1,243	74,509	4,193	6,388	23,072	108,162	1.76	153
	Second	685	739	84,693	2,498	4,631	33,679	125,501	1.08	183
	Other	366	340	52,188	1,501		12,596	66,285	.93	181
	Total	1,758	2,322	211,390	8,192	11,019	69,347	299,948	1.32	171
Lake McDonald	First	1,777	1,201	43,036	4,289	35,777		83,102	.68	47
	Second	1,197	689	14,177	1,530	18,814		34,521	.58	29
	Other	342	205	4,682	126	1,375		6,183	.60	18
	Total	3,316	2,095	61,895	5,945	55,966		123,806	.63	37
East Glacier	First	446	1,289	46,129	15,236	11,712	111,862	184,939	2.89	415
	Second	388	720	37,434	5,497	30,577	2,385	75,893	1.86	196
	Other	86	174	13,373	578	1,633	275	15,859	2.02	184
	Total	920	2,183	96,936	21,311	43,922	114,522	276,691	2.37	301
Oldman Lake	First	768	1,487	150,273	102			150,375	1.94	196
All Areas	First	4,379	5,665	346,655	66,996	86,863	134,934	635,448	1.29	145
	Second	2,889	2,349	139,581	12,043	55,217	36,066	242,907	.81	84
	Other	1,055	979	72,405	5,883	4,072	12,871	95,231	.93	90
	Total	8,323	8,993	558,641	84,922	146,152	183,871	973,586	1.08	117



BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1947

By

John C. Gynn, Operation Supervisor

Clarence M. Chapman, Pathologist

Ribes eradication for the control of white pine blister rust in Yellowstone National Park was performed on the Mount Washburn and Craig Pass areas. A total of 4,877 acres was initially worked, removing 79 ribes per acre at an expenditure of .65 man-days per acre.

Mount Washburn. One thousand five hundred and fifty-seven acres received initial eradication work, 231 ribes per acre being removed at a cost of 1.79 man-days per acre. Work started June 26 and continued until September 6. The crew varied in size from 41 to 78 men in the field, with 1 experienced superintendent and 4 foremen. All foremen but one had previous blister rust control experience although not as foremen. The men employed for ribes eradication were of high quality. Many difficult areas were encountered in the cliffs and rocks on the east, south and west sides of Mount Washburn, necessitating the use of ropes and boatswain's chair. Nearly all of this type of work in the area was completed. The decapitation method was used extensively in the heavy Ribes montigenum growths. Over 1,200 pounds of ammonium sulfamate powder were applied to broken roots, and to ground where root masses were removed. The R. petiolare on Carnelian Creek were sprayed with 2,4-dichlorophenoxyacetic acid. After checking, the 1947 work was classified as follows: 245 acres of maintenance, 248 acres of rework, and 1,064 acres of post check. Although the final check showed the areas classified as post check as being practically free of ribes, this classification was necessary because of the number of ribes removed and the danger of regeneration in certain spots. After a check is made in 1949 or 1950 a large percentage of the area may go directly into the maintenance category. A check of the Mount Washburn areas worked in 1946 shows that these areas should be reworked. An advance check shows that all unworked area between the Canyon-Tower Falls road and the west control boundary, from Dunraven Pass on the south, to the north end of the control area, will have to be covered as no ribes-free acreages are present.

Craig Pass. Three thousand three hundred and twenty acres were initially worked or scouted, at a cost of .12 man-days per acre, removing 7 ribes per acre. Work started June 25 and was completed July 30. The crew consisted of 30 men and 2 experienced foremen. On July 12, 15 men and 1 foreman were moved to the Mount Washburn project, and on completion of work the rest were transferred. Both crew and foremen were high quality men and exceptionally good work resulted. Control and work area boundaries were determined from the 1946 advance check map. Although the check indicated much of the area to be ribes-free, all areas not needing an intensive coverage were systematically scouted but no ribes were found. Several small cliff areas required the use of ropes and boatswain's chair to remove ribes on overhanging ledges and precipitous slopes. No regular checking was done after working other than random inspections. Of the 3,320 acres in the control area, 2,881 were placed on maintenance and 439 on post check. No reworking will be necessary until after the regular check has been completed and a future control plan made.

Blister Rust Infection. Although a number of inspections were made in the Mammoth control area this season no infection was found. On Slide Lake Creek three miles north of Mammoth Hot Springs, infection on R. petiolare was found to be twice as heavy as in 1946. Only a few white pine are present in the immediate vicinity of this infection, and all were found to be free of rust. The following areas were examined for infection with negative results: Craig Pass, Mount Washburn, Gibbon River, Gardiner River, Yellowstone River (at Tower Falls and near Gardiner, Montana), Lamar River (near junction with the Yellowstone), and Carnelian Creek.

RECOMMENDATIONS

Mammoth. The following recommendation is made for 1948 for the Mammoth area: Make an early season check over the entire area, using the checker flanker method, to eliminate any ribes-free acreage from the 1948 working. Rework upland areas showing ribes. Spray resprouting R. petiolare on Glen Creek, Clematis Gulch, and the seedling spots with 2,4-dichlorophenoxyacetic acid. This work will require a crew of 30 men, 1 experienced foreman, and 1 experienced superintendent for a 2-week period starting between June 7 and 14.

Mount Washburn. Complete initial working between the Canyon-Tower Falls road on the east, the control boundary on the west, and the Dunraven Pass 1947 work limits on the south. With the completion of the survey and the resulting accurate map of the Mount Washburn area, the western boundary has been set at Carnelian Creek. This location is necessary to secure adequate protection zones and to eliminate infection hazards along Carnelian Creek. After an advance check to eliminate any ribes-free area, complete initial work on the 20-chain protection strip on the east side of the control area. Finish work on the Carnelian Creek stream type. Rework all the area worked in 1946 on the south side of the Mount Washburn-Dunraven Pass ridge as indicated by the 1947 regular check. The following estimate is made for 1948 for the Mount Washburn area: For a complete $2\frac{1}{2}$ -month period starting between June 21 and 28 a crew of 30 men, 1 foreman, and 1 superintendent. This crew would be transferred from Mammoth on completion of ribes eradication work there.

Craig Pass. In 1948 make a 4 per cent check with flankers on the areas where intensive ribes eradication work was performed in 1947. No eradication work is anticipated in 1948.

In order to obtain the complete effective working period it is recommended that 7 more laborers than estimated be hired at the start, to take care of time lost from rain, fire, and crew reductions resulting from quits, discharges and those leaving early for school.

RESULTS

The following tables show statements of expenditures, results of the 1947 field work, and accumulative results of all work done to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1947 YELLOWSTONE NATIONAL PARK

Item	National Park Service
	Regular BLR-5
Personal Services	\$53,419.55
Travel & Transportation	1,113.78
Subsistence	1,503.15
Supplies & Materials	4,724.66
Salary, Checkers	488.70
Total	\$61,249.84



TABLE 2
SUMMARY OF RIBES ERADICATION, 1947
YELLOWSTONE NATIONAL PARK

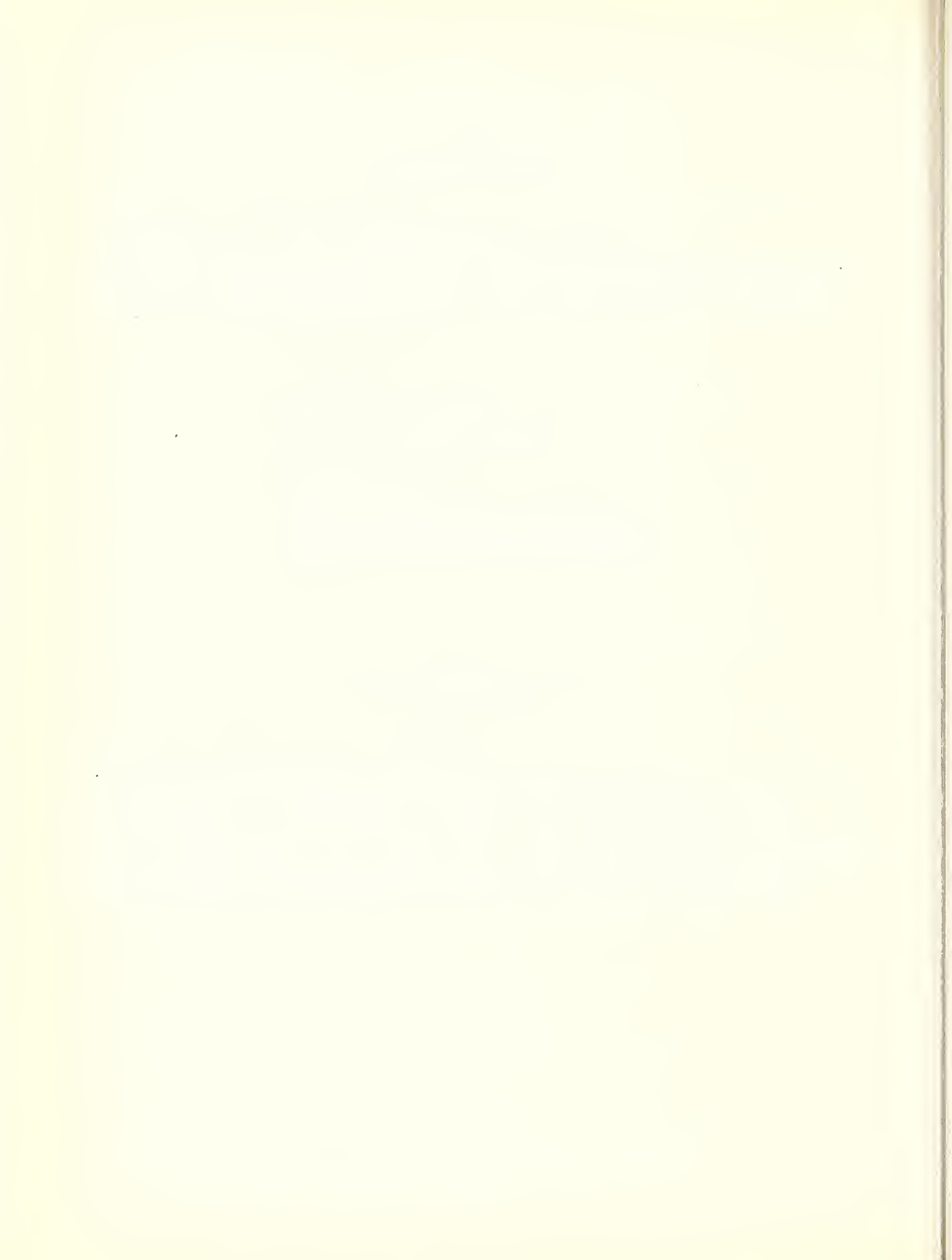
Area	Working	Acres	Man-Days	Ribes Species					Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes montigenum			Man-Days	Ribes
Mount Washburn	First	1,557	2,780	67,191	1,953	11,308	381	279,601	360,434	1,101	1.79	231
Craig Pass	First	3,320	392	7,599	2,962		2,340	9,582	22,483		.12	7
All Areas	First	4,877	3,172	74,790	4,915	11,308	2,721	289,183	382,917	1,101	.65	79

TABLE 3
SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1945-1947
YELLOWSTONE NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
NP-CPS	1,567	992	95,769	765	.63	61
NP-Reg.	5,476	3,940	477,117	2,157	.72	87
Total	7,043	4,932	572,886	2,922	.70	81

TABLE 4
SUMMARY OF RIBES ERADICATION, 1945-1947
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species							Total Ribes	Gallons Spray	Per Acre	
				Ribes lacustris	Ribes viscosissimum	Ribes petiolare	Ribes inerme	Ribes satosum	Ribes cersum	Ribes montigenum			Man-Days	Ribes
Mammoth	First	1,578	1,038	8,322	2,331	18,990		63,001	12,215		104,859	1,646	.66	66
	Second	152	67			2,295		3,478	621		6,394	175	.44	42
	Total	1,730	1,105	8,322	2,331	21,285		66,479	12,836		111,253	1,821	.64	64
Mt. Washburn	First	1,993	3,435	72,621	3,028	11,308	381			351,812	439,150	1,101	1.72	220
Craig Pass	First	3,320	392	7,599	2,962		2,340			9,582	22,483		.12	7
All Areas	First	6,891	4,865	88,542	8,321	30,298	2,721	63,001	12,215	361,394	566,492	2,747	.71	82
	Second	152	67			2,295		3,478	621		6,394	175	.44	42
	Total	7,043	4,932	88,542	8,321	32,593	2,721	66,479	12,836	361,394	572,886	2,922	.70	81



DEVELOPMENTAL WORK IN METHODS OF RIBES ERADICATION, AND PROGRESS OF RIBES
ECOLOGY AND DISEASE CONTROL STUDIES IN THE NORTHWESTERN REGION FOR 1947

By

V. D. Moss, Forest Ecologist; C. R. Stillinger, Pathologist;
R. T. Bingham, Agent; and H. R. Offord, Pathologist

FOREWORD

Activities of the development and improvement project BLR-1-6 for the calendar year 1947 include office, laboratory, greenhouse, and field work. The present annual report, as in past years, is primarily on field work. The material is presented in three sections. Section I is a status report on the various field studies in methods of ribes eradication, problems of the ecology of ribes, and disease control investigations currently in progress. Section II is a discussion of these studies and the presentation of results. Section III is a report of laboratory and greenhouse activities and includes a listing of special reports and publications for the year 1947.

Results of the 1946 studies in the use of 2,4-dichlorophenoxyacetic acid as a herbicide for ribes are given under chemical tests in 1946, section II. Chemical investigations currently in progress are reported under herbicides tested in 1947. Major attention this season was directed toward tests of 2,4,5-trichlorophenoxyacetic acid as a herbicide for ribes eradication. Spray equipment also came in for its share of attention including tests with both back pack and power units. The Hi-Fog gun, described and shown in plate 1 of this report, proved an important addition to spray equipment. Many improvements were made in the shop and field to increase the efficiency of operating power sprayers. New type nozzles were developed for mist spraying with power at a 2-week's spray school in October at Clarkia, Idaho. Tests were also conducted to determine size and length of hose, and methods of organizing a power spray crew for the best job possible.

Recommendations for practical chemical work are being deferred except as noted. Special memorandum of instructions will be provided and sent to the field as early in the spring as possible after inspecting past season's tests. Stocks of 2,4-D on hand should be used for spraying Ribes petiolare according to previous instructions. Similarly, Ammate on hand should be used as previously instructed.

A status report is presented on the studies of the ecology of ribes in relation to eradication control measures and timber management practices. Except for making current inspections of all ecological plots little time was devoted to this field of study. Instead, every effort was concentrated toward the more important projects at this time of chemical investigations and the development of white pine management plans closely coordinated with the problems of the ecology of ribes. As a result no progress reports are included this year although a brief summary of each ecological study is given under section I.

Under disease control plot studies infection conditions on ribes during 1947 are reported by Stillinger. There is also included a study of rust damage to white pine reproduction and pole stands resulting from long periods of exposure to ribes populations. Basic data for these damage studies were obtained from permanent plots on the St. Joe and Clearwater Forests. General recommendations are

given for more closely observing the extent of rust damage to pole stands in the region. A report is made of the increase in spread of Tuberculina maxima, a parasitic organism of blister rust cankers.

Field activities by Bingham during 1947 ranged from independent studies in disease control investigations to providing assistance in the establishment of chemical tests and the practical application of stocking-damage surveys on two control operations. An annual inspection was made of the R. lacustre small-bush study on the Coeur d'Alene National Forest. Additional soil samples were secured and analyzed to determine the usefulness of soil analysis by rapid chemical tests in judging the ribes potential of an area prior to the decisions of cutting practices. All field activities are reported upon herein or in special reports.

I. SUMMARY

A. Tests of 2,4-Dichlorophenoxyacetic Acid and 2,4,5-Trichlorophenoxyacetic Acid for Ribes Eradication

1. Status of work. Field tests in 1946 of 2,4-D on R. petiolare, R. viscosissimum, and R. lacustre were examined to determine the effectiveness of kill. Treatment of R. petiolare with the butyl ester of 2,4-D during a period of unsettled weather in the early spring season resulted in a higher per cent bush kill than treatment with the sodium and ammonium salts of 2,4-D. Rain seems to be without effect on the toxicity of ester formulations of 2,4-D. However, it is undesirable to spray during a rain or immediately thereafter when the foliage is wet. An interval of 4 hours of dry weather after spraying will provide an adequate margin of safety in applying aqueous solutions of the ammonium or sodium salts of 2,4-D. Chemical concentrations as low as 50 p.p.m. of the butyl ester of 2,4-D gave 100 per cent bush kill in early season applications. For practical field work in the treatment of R. petiolare 2,4-D is used in spray solution at a concentration of 800 p.p.m.

Neither the ammonium nor amine salts, nor ester formulations of 2,4-D in spray solution have produced effective results in the treatment of mature R. lacustre bushes. At best only a small amount of live stem can be killed. On the other hand about 50 per cent kill is possible in the treatment of fast growing R. lacustre seedling with concentrations of 1,000 p.p.m. or higher of 2,4-D. With thorough coverage of leaves and stems 100 per cent of R. viscosissimum seedlings can be killed with spray solutions of 2,4-D at 1,000 p.p.m. or higher. For the reason mature bushes of R. viscosissimum are only moderately susceptible less than 50 per cent can be killed with concentrations of 1,000 p.p.m. or higher of 2,4-D. Aerial coverage of leaves and stems with spray solution proved as effective in the treatment of seedlings as the combined methods of aerial coverage and soil drench.

The extensive program developed this season in testing the new hormone 2,4,5-trichlorophenoxyacetic acid as a herbicide for ribes is of major interest in the region. Tests with this chemical in the greenhouse at Berkeley during the winter resulted in kill of R. lacustre, a species

which has been highly resistant to 2,4-D. For the reason the effectiveness of hormone sprays can rarely be determined the season of treatment, final results of tests with 2,4,5-T must await the 1948 growing season. A late fall season observation of these tests showed that ribes bushes treated with 2,4,5-T were not resprouting the season of treatment irrespective of the concentration of parent acid. On the other hand, nearly all R. lacustre and R. viscosissimum bushes sprayed with 2,4-D were showing resprouts by the middle of September. Dates of applying 2,4,5-T and 2,4-D sprays were the same for this comparison.

Lack of any resprouting from bushes treated with 2,4,5-T may or may not be any indication of final results this coming spring. In order to obtain a preseasonal index of the effectiveness of 2,4,5-T, a number of R. lacustre and R. viscosissimum treated bushes were carefully potted in October and placed in the laboratory's culture chamber. These particular bushes were treated with the amine salt of 2,4,5-T acid in a concentration of 1 part to 9 parts water. Date of treatment was July 8. Three of four R. lacustre crowns have resprouted. No resprouts have developed from R. viscosissimum. This attempt to induce resprouting in the culture chamber has shown that treatment of R. lacustre with 2,4,5-T will be much more satisfactory than with 2,4-D. Whatever the final results of this season's tests it must be remembered that all treatments were made rather late in the growing season at a time when ribes were fully foliated and were maturing fruits. May and June treatments, which are scheduled for this coming spring, will be the final criterion for judging the effectiveness of 2,4,5-T sprays on mature R. lacustre and R. viscosissimum bushes.

Many improvements were made this season along the lines of obtaining and developing suitable spray equipment for the region. One important contribution for chemical eradication work was in procurement of a number of Hi-Fog guns for mist spraying of hormone concentrates. A small portable power sprayer also found an important place in the spraying program. The large truck-mounted power units were used continuously through the spray season and to great advantage on all the forests. Two weeks were spent in chemical methods development by the entire technical organization in October at Clarkia, Idaho. Tests were conducted to determine efficient methods of laying hose line, efficient lengths and sizes of spray hose, and methods of organizing spray crews to increase acreages worked per man-day. A number of new type nozzle heads were developed at this school which give promise of better coverage with less amounts of chemical solution per acre.

B. Ecological Studies of Ribes and Western White Pine

1. Status of work. The more pressing problems in chemical investigations and the development of white pine management plans this season took precedence over the time which usually would have been given to ecological studies. Only the essential work necessary to record current data and maintain permanent ribes ecology plots was carried on this year. Studies currently in progress on the ecology of ribes and western white pine are summarized as follows:

- (a) Plots of the influence of variable light and moisture conditions on germination, growth, and development of upland ribes and white pine seedlings were inspected for new seedling germination. Seeds of R. lacustre are continuing to germinate on all three soil surfaces; duff, mineral and burnt-mineral, under full shade conditions. Seedlings of R. lacustre originating by soil surfaces in 1947 at the full shade station are as follows: 31 seedlings on duff surface, 17 seedlings on mineral surface, and 5 seedlings on burnt-mineral surface. No new seedlings were found for either R. viscosissimum or white pine. Previous reports on this study are contained in the 1940 to 1946 annual reports. Current inspections for new seedlings is the only phase of this study being continued.
- (b) The study of longevity of ribes seeds following logging or a fire was extended into many new areas. It is the purpose of this study to determine for how long after logging or a fire the undisturbed stored ribes seed in the soil will remain viable. Sufficient data will have been accumulated with the 1948 season to give enough basic information of interest for the annual report. One phase of this study, which involves the collection, screening, identification and laboratory germination of ribes seed collected from samples of the forest floor mantle, has been curtailed for reasons already explained. This phase of work will be emphasized in the 1948 project program now that adequate facilities have been developed in the laboratory for germinating ribes seed.
- (c) Studies of slash disposal measures in relation to ribes control problems were continued in cooperation with the Forest Service, Potlatch Forests, Inc., and the Slash Disposal Committee of the Inland Empire Section, Society of American Foresters. The trend in slash disposal is away from complete to partial disposal of hazardous fuels along roads and on ridge tops. Such practices are to the advantage of blister rust control work in that ribes seedlings originating from the disturbance by fire are limited in number and inhabit small areas of the total cutting unit. Observations will continue to be made of slash study areas to determine relationships with ribes control problems and the regeneration of white pine.
- (d) Studies of the ecology of ribes in relation to silvical practices in the western white pine type are being continued in cooperation with the Division of Timber Management, Forest Service, and the Northern Rocky Mountain Forest and Range Experiment Station. Work this season was directed toward the determination of ribes potentials on proposed sale areas. The Steamboat sale area on the Coeur d'Alene Forest occupied the majority of time normally devoted to ecological studies. Cutting in the Little East Fork of Steamboat has been completed which afforded an opportunity this season of examining the results of varying intensities of marking and cutting. Many of the cuttings produced a forest condition favorable for the suppression of ribes by the establishment of a balance between sunlight and canopy shade reaching the forest floor. Other management units were found overcut from the standpoint of practicing good

silviculture and obtaining ribes control. The sole weakness in marking resulted from placing too much reliance upon volume percentages without adjustment for difference in composition between slopes. Proposed plans for this coming season include the establishment of a number of 10-acre plots in the East Fork of Steamboat for the purpose of intensifying the over-all study of marking standards.

- (e) Wide use was made this season of the habitat index in predetermining the potential ribes problem on an area. The seven factors which go to make up this ribes potential key are listed in the 1946 annual report. Some refinement in evaluating one factor in relation to another still must be made before the index can be expected to give consistently reliable results. The accuracy now obtainable is surprisingly high as judged by the number of ribes seedlings germinating from recent logging disturbances on those areas studied.
- (f) Investigations are being continued in direct seeding of white pine. The objective is the development of better methods for preconditioning of seed and for seed sowing.

C. Disease Control Plot Studies

1. Status of work. The annual inspection of ribes by Stillinger on permanent plots throughout the region showed more bushes and leaves infected this year than in 1946 but the intensification of rust on ribes was considerably less. The dry summer months of July and August probably prevented the rust from intensifying. Nevertheless, spread of the rust from ribes to pine probably amounted to a major wave of infection this fall season due to favorable weather conditions, and to the fact that more bushes and leaves carried infection than in normal years.

Besides completing annual inspections and maintaining all permanent disease control plots, Stillinger gave special attention to the amount of rust damage in stands of reproduction and pole timber which have been exposed to variable numbers of ribes for periods of 15 to 20 years. General location of stands examined on the St. Joe Forest include a permanent disease control plot in the Middle Fork drainage of the St. Maries River, Crystal Creek plot 11, Squaw Creek and the Upper Basin near Elk River, and a stand of reproduction in the vicinity of Camp 205. On the Clearwater Forest the Snake Creek pole stand was examined, Quartz Creek, the Powder House area, and a pole stand near Blister Rust Control Headquarters. All the stands examined showed that losses from the rust approach 100 per cent when pine is left exposed to ribes for periods of 15 to 20 years.

Because of wide interest in the effects of distribution and density of western white pine stocking upon estimates of the degree of blister rust damage in a stand, an intensive investigation on this important control question was inaugurated this season by Bingham. Sampling for damage in relation to stocking is by four 10-year age classes, 0 to 40. Density of stocking is segregated into three intensities; light, medium and

heavy, as is the amount of blister rust damage. About half the sampling necessary to obtain sufficient representation within each age group, stocking intensity, and rust damage class was completed this season. Each of the three stocking intensities for each stand age class will have samples of light, medium and heavy rust damage. A progress report is given covering sampling methods and preliminary results. During the fall season Bingham assisted two of the control operations in putting stocking-damage surveys into practice.

Much of Bingham's time was devoted to assisting in the establishment of chemical tests on three of the four north Idaho forests. This included the examination of chemical tests in 1946 and the establishment of tests in 1947. The R. lacustre small-bush study located in the Ames Creek drainage on the Coeur d'Alene National Forest was examined to determine the amount of rust on ribes. A preliminary report of this study was issued June 18, 1947, as Serial No. 140.

In order to determine the practicability of applying soil analysis by rapid chemical tests in the determination of ribes potentials, forest soil samples along survey strips were secured from the Little East Fork drainage of Steamboat Creek in the Coeur d'Alene National Forest. This drainage was selected because estimates of ribes potentials in each stand had been made by an ecological key and cutting operations were complete as of 1947. After ribes have germinated in 1948, an opportunity will be afforded for re-examining soil analysis data in relation to ribes germination as well as to observe the accuracy of predetermining ribes potentials by the presently employed ecological key.

II. FIELD WORK

IMPROVEMENT OF CHEMICAL METHODS FOR RIBES ERADICATION

The only chemical tested in the field during 1946 was 2,4-dichlorophenoxyacetic acid. Ammate (ammonium sulfamate) was employed by the control operations for practical spray and decapitation work.

Results of 2,4-D tests on stream type R. petiolare and R. lacustre, Middle Fork of the St. Maries River, St. Joe National Forest, Clarkia, Idaho, are shown in table 1. Commercial formulations of a 60 per cent sodium salt, an 83-1/3 per cent ammonium salt, and a 40 per cent butyl ester of 2,4-D were used for the study. A dosage of 1 gallon per milacre was applied as an aerial and soil drench with the back pack type sprayer. The chemical concentration of parent acid for the early season June 5 tests was 50, 100, 200, and 500 p.p.m. Day air temperature during application was around 70 degrees. Weather was partly cloudy with a light shower falling about 1½ hours after treatment. This rain is believed responsible for the lower per cent bush kill in the sodium and ammonium salt tests as compared to results of the butyl ester series. Because of an oil base and an emulsifying agent used to disperse the esters of 2,4-D, the active ingredient (2,4-D) is not easily washed from a plant or diluted by rain. This fact largely accounts for the perfect bush kill at a time in the season when ribes are most susceptible for reasons of rapid growth development. Likewise, the esters appear

to be more readily absorbed than the salts by plants in early season when air temperatures are cool. The esters of 2,4-D are thus recommended for early spray work until weather becomes settled and day air temperature is in the seventies.

The July 30 tests of 2,4-D differed from the early season treatments only in the chemical concentration of parent acid. The acid content was increased and graduated by intervals of 100 from 200 to 500 p.p.m. This was done for the reason ribes were approaching the end of their growing season with fruits fully developed and beginning to color. When current year's wood begins to harden off about the time fruits commence to ripen, ribes gradually develop resistance to 2,4-D sprays which increases as the fall season approaches. This phenomenon occurs with all species of ribes, even R. petiolare, the most susceptible to 2,4-D sprays. However, the degree of resistance varies with individual plants within a species, especially about the time and after ribes have attained full season's growth.

TABLE 1

RESULTS OF 1946 SPRAY AND SOIL DRENCH TESTS OF 2,4-D ON R. PETIOLARE AND R. LACUSTRE, MIDDLE FORK ST. MARIES RIVER PLOTS, ST. JOE NATIONAL FOREST, CLARKIA, IDAHO

Plot No. and Date Treated	Type of 2,4-D Product	Parts Per Million	Per Milacre							
			R. petiolare				R. lacustre			
			No. Bushes		Per Cent Bush Kill	Per Cent Live Stem Kill	No. Bushes		Per Cent Bush Kill	Per Cent Live Stem Kill
			Treated	Killed			Treated	Killed		
6/5	1 60%	50	11	3	27	74	1			29
	2 Sodium	100	9	8	89	96	1			
	3 Salt	200	6	4	67	39				
	4	500	6	5	83	98				
	5 83-1/3%	50	7	5	71	58				
	6 Ammonium	100	4			56				
	7 Salt	200	9	7	78	96				
	8	500	8	8	100	100				
	9 40%	50	6	6	100	100				
	10 Butyl	100	10	10	100	100	2			
	11 Ester	200	8	8	100	100	1			
	12	500	13	13	100	100	1			
7/30	13 60%	200	1	1	100	100	4			
	14 Sodium	300	5	5	100	100				
	15 Salt	400	2	2	100	100				
	16	500	1	1	100	100				
	17 83-1/3%	200	3	3	100	100	1			
	18 Ammonium	300	4	4	100	100	1			
	19 Salt	400	7	3	43	94				
	20	500	7	7	100	100				
	21 40%	200	4	3	75	94				
	22 Butyl	300	8	8	100	100	3			
	23 Ester	400	4	3	75	99	1			
	24	500	4	4	100	100				

Weather during the July 30 tests was clear with day air temperature in the lower eighties. Variation in the per cent bush kill probably was a result of individual bushes differing in the degree of susceptibility to 2,4-D spray as already explained. Inadequate spray coverage of leaves and stems for lateness of treatment may have also resulted as full development of associated vegetation made it difficult to thoroughly search out all ribes stems and leaves. In spraying on a milacre basis there is always the possibility of missing trailing stems along or extending outside the plot boundary. In a couple of cases resprouting of the July 30 tests was from missed borderline stems but with the parent root crown well within the plot boundary. To obtain satisfactory kill with hormone sprays care must be taken to obtain thorough spray coverage of all stems and leaves. This practice must not be diverged from regardless of the species of ribes being treated, the stage of growth development, or the type of spray equipment used. The few R. lacustre bushes sprayed with 2,4-D in the R. petiolare plots revealed high resistance to hormone sprays.

In methods section of the 1946 annual report table 6, a series of tests was shown employing concentrates of butyl ester of 2,4-D as a spray for mature R. lacustre bushes. This study was established alongside the R. petiolare plots discussed in the previous paragraphs. The purpose was to determine whether chemical resistance might be lowered by treatment with concentrates. The parent acid content was graduated by intervals of 1,000 from 1,000 to 4,000 p.p.m. A dosage of 1 gallon per milacre was applied as an aerial and soil drench. The butyl ester was used as previous tests had been made on R. lacustre with the sodium and ammonium salts. As no bush kill was obtained with the concentrates of butyl ester, the results are of no importance for tabulation in this report. Neither the acids nor esters of 2,4-D have produced kill of mature R. lacustre bushes.

In the belief fast growing ribes seedlings might prove more susceptible to 2,4-D sprays than mature woody plants, a series of tests was established on the recent Hendrick's burn, Lower West Branch of Priest River, Kaniksu National Forest. The results of treating R. viscosissimum and upland R. lacustre seedlings are shown in table 2. The first series of treatments was made June 12 and the second series on August 6. Day air temperature and weather were favorable for both series of tests. The chemical concentrations of parent acid ranged from 500 to 3,000 p.p.m. The 40 per cent butyl ester as an aqueous spray was applied as an aerial and soil drench at the rate of 1 gallon per milacre. The average age of seedlings on the burn was three years with an occasional plant two and four years old. The chemical treatment of R. viscosissimum seedlings proved highly effective. All but one seedling was killed in each of the seasonal series tests. A concentration of 1,000 p.p.m. appears adequate from these tests for practical field work. A much better kill of R. lacustre seedlings was obtained than anticipated. All but one bush was killed in the June 12 tests. The few seedlings treated in the August 6 series showed an increased degree of chemical resistance developing with termination of current season growth development. It was on the basis of the results from this study that recommendations were submitted for practical spray work with 2,4-D in the treatment of R. viscosissimum seedlings on cutover and recently burned areas.

A question regarding method of applying 2,4-D sprays with aerial treatment alone compared to aerial treatment plus soil drench is answered in table 3. This

study was established on the Hendrick's burn previously described using 3 and 4 year seedlings for demonstration. The aerial and soil drench combination test was made with the back pack sprayer. For aerial coverage alone a rose type garden sprayer was employed for applying the spray solution. Table 3 shows the comparative amounts of solution applied with each sprayer. The 40 per cent butyl ester of 2,4-D in aqueous solution was used at concentrations ranging from 1,000 to 9,000 p.p.m. Twenty-five R. viscosissimum and five R. lacustre seedlings were included for each test. A 100 per cent bush kill was obtained in the treatment of R. viscosissimum seedlings by both methods of applying spray solution and for all concentrations of 2,4-D tested. Aerial treatment alone thus proved to be as effective as the combination aerial plus soil drench and with a considerable saving in amount of solution for the job. Treatment of R. lacustre seedlings was only partly successful. Method of applying spray solution did not make any appreciable difference in bush kill. Bush kill was fairly good with chemical concentrations of 5,000 p.p.m. and higher but results are inconsistent. Early season treatment when seedlings are producing new growth might have given better results than obtained with August tests.

TABLE 2

RESULTS OF 1946 SPRAY AND SOIL DRENCH TESTS OF ONE GALLON 2,4-D SPRAY PER MILACRE ON R. VISCOSISSIMUM AND R. LACUSTRE SEEDLINGS, HENDRICK'S BURN, LOWER WEST BRANCH OF PRIEST RIVER, KANIKSU NATIONAL FOREST, IDAHO

Plot No. and Date Treated	Type of 2,4-D Product	Parts Per Million	Per Milacre							
			R. viscosissimum				R. lacustre			
			No. Bushes		Per Cent Bush Kill	Per Cent Live Stem Kill	No. Bushes		Per Cent Bush Kill	Per Cent Live Stem Kill
			Treated	Killed			Treated	Killed		
6/12	1	500	18	18	100	100				
	2 40%	750	16	15	94	99				
	3 Butyl	1,000	18	18	100	100				
	4 Ester	1,500	16	16	100	100	4	3	75	60
	5	2,000	13	13	100	100	1	1	100	100
	6	3,000	17	17	100	100	1	1	100	100
8/6	7	500	13	12	92	83				
	8 40%	750	16	16	100	100				
	9 Butyl	1,000	14	14	100	100	3			
	10 Ester	1,500	17	17	100	100				
	11	2,000	27	27	100	100				
	12	3,000	19	19	100	100	1	1	100	100

TABLE 3

RESULTS OF 1946 AERIAL SPRAY VERSUS AERIAL AND SOIL DRENCH TESTS OF
2,4-D ON R. VISCOSSISSIMUM AND R. LACUSTRE SEEDLINGS,
HENDRICK'S BURN, LOWER WEST BRANCH OF PRIEST RIVER,
KANIKSU NATIONAL FOREST, IDAHO

Plot No. and Date Treated	Type of Appli- cation	Butyl Ester of 2,4-D P.P.M.	R. viscosissimum				R. lacustre			
			No. Bushes		Per Cent Kill	Per Cent Live Stem Kill	No. Bushes		Per Cent Kill	Per Cent Live Stem Kill
			Treated	Killed			Treated	Killed		
8/7 1-A	Spray	1,000	25	25	100	100	5			18
1-B	Spray & Soil Drench	1,000	25	25	100	100	5	1	20	38
2-A	Spray	3,000	25	25	100	100	5	3	60	84
2-B	Spray & Soil Drench	3,000	25	25	100	100	5	1	20	42
3-A	Spray	5,000	25	25	100	100	5	5	100	100
3-B	Spray & Soil Drench	5,000	25	25	100	100	5	4	80	95
4-A	Spray	7,000	25	25	100	100	5	5	100	100
4-B	Spray & Soil Drench	7,000	25	25	100	100	5	3	60	87
5-A	Spray	9,000	25	25	100	100	5	5	100	100
5-B	Spray & Soil Drench	9,000	25	25	100	100	5	5	100	100

HERBICIDES TESTED IN 1947

Extensive field tests were undertaken this season with the plant growth regulator 2,4,5-trichlorophenoxyacetic acid. Major attention was given this hormone after greenhouse studies at Berkeley during the winter showed that R. lacustre could be readily killed by spraying leaves and stems with aqueous 2,4,5-T solution or esters of 2,4,5-T in kerosene. This species of ribes has been highly resistant to all tests with 2,4-D.

As soon as chemicals could be obtained, field tests were scheduled for the four North Idaho forests to study chemical concentrations, dosages, diluents, spray methods, and seasonal effect of applying 2,4,5-T. For field tests, an amine salt and an ester formulation of the parent acid of 2,4,5-T was employed in spray work. Both these formulations were prepared by a west coast chemical company. Concentration of parent acid was 1 pound per gallon of solvent. The amine salt of

2,4,5-trichlorophenoxyacetic acid was diluted in water for spray solution. The ester (ethyl) was diluted in kerosene and in standard stove or fuel oil. All applications of 2,4,5-T were made with the Hi-Fog gun.

Tests were initiated July 8 and replicated through September 3. Earlier season applications should have been made, but chemical formulations were not received until early July. Consequently, this season's work was started at a time when ribes were commencing to develop seasonal resistance to hormone sprays; this increases as the fall season approaches. The degree and rapidity with which resistance develops varies with ribes species, age of bush, and habitat. Full potentialities of 2,4,5-T cannot be determined from this season's late applications. It will be necessary to establish early season tests in 1948 during the time ribes are growing rapidly as this is the period of greatest susceptibility to hormone sprays.

Companion tests with 2,4,5-T were made with the methyl ester of 2,4-D diluted in kerosene or in fuel oil. A concentrate of the latter was prepared commercially by the same chemical concern on the west coast furnishing concentrates of 2,4,5-T. The amount of parent acid of 2,4-D contained in the formulation was 1 pound per gallon of solvent. Many other chemical spray tests were conducted during the season using special formulas of 2,4-D to which were added other chemicals or plant extracts. One of these is known as King's formula. To the ammonium salt of 2,4-D is added potassium chloride, ammonium phosphate, and glycerol. The quantities of each chemical going into this formula are given in the Clearwater and St. Joe Forest tables of spray and dust tests. The purpose of adding glycerine is to reduce evaporation of spray solution from leaves and stems and to lower surface tension of water. Potassium chloride and ammonium phosphate are added for the purpose of inhibiting resprouting, presumably by maintaining a buffered pH reaction slightly on the acid side.

Another formula tested added onion extract to the sodium salt of 2,4-D. The fact that significant increases occur in the herbicidal action of the salt of 2,4-D when onion extract is added was reported by C. L. Hamner of the Michigan Agricultural Experiment Station. It was later found that herbicidal action could be similarly increased by adding a sufficiently strong acid as phosphoric to give an unbuffered solution with a pH range between 2 and 3. Hamner reported that "the titratable acid (within its noninjurious range) rather than the pH value of a solution accounts for the increased effect of the 2,4-D herbicide." The onion extract for field tests was prepared by sectioning and grinding, then filtering the pulp. The proportion of onion extract to chemical solution is shown in the Clearwater, St. Joe, and Coeur d'Alene tables.

In addition to chemical spray tests, many decapitation studies were established applying 2,4-D concentrates to the cut portions of ribes stems, roots, and severed crowns. Height which stems were cut and treated was 1 inch, 2 inches, and 3 inches above the soil surface. A chemical concentration of 5, 10, and 20 per cent of a liquid 40 per cent butyl ester concentrate of 2,4-D measured volumetrically with water as a diluent and applied from a spouted oil can was used for the decapitation work. Both R. lacustre and R. viscosissimum were included in this study. A small amount of dusting work was undertaken with a 5 and 15 per cent isopropyl ester dust of 2,4-D. Application was made with an inexpensive type of garden duster.

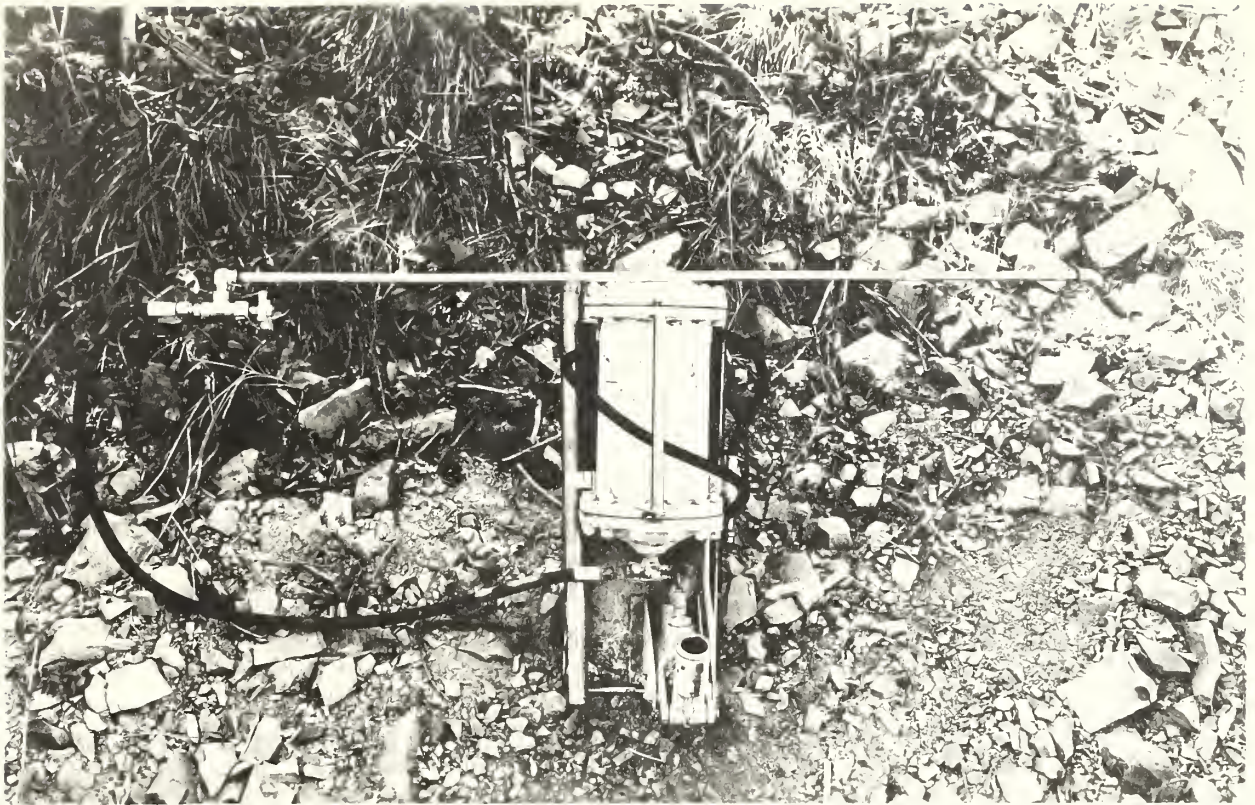
Testing and use of new chemicals always present the problems of developing suitable equipment for the job. The Hi-Fog gun manufactured by Banta & Driscoll Company, Los Angeles, California, was used in applying nearly all the spray solution tests. This gun is a high pressure back pack mist type of sprayer with a liquid capacity of 3-3/5 pints. A pressure cylinder is filled with spray solution by means of a hand operated hydraulic pump. The solution is forced against a permanent nitrogen charge of 350 pounds pressure contained in the top of the cylinder by a floating piston. When fully charged the cylinder has an initial operating pressure of 1,000 pounds which drops to the 350 pound nitrogen pressure upon exhausting the 3-3/5 pints of spray solution. Weight of an empty gun is 26 $\frac{1}{2}$ pounds.

The two photographs in plate I show (W-438) the gun as finally equipped for ribes spraying, and (W-436) its operation in the treatment of a large R. viscosissimum bush with a mist type spray. A short galvanized pipe about 22 inches furnished by the manufacturer for extending the nozzle was replaced with one 36 inches long. This length was originally adapted for the chlorate and Ammate back pack trombone sprayers. To the end of the galvanized pipe extension was attached a 45 degree elbow mounting a new type of atomizing nozzle head. The angled mounting of the nozzle was found necessary for control of the mist spray down on a bush and upward over stems and under surface of leaves. Originally, mounting was direct to the straight extension. For the reason the mist spray is dispersed in cone-like fashion much solution will be wasted unless the nozzle is angled to deliver perpendicular to surfaces treated. Such mounting will materially reduce the difficulty of controlling the mist spray in wind.

Various size nozzle heads of the atomizing type were tested including numbers .60, 1, 2, 3, and 4 on the Hi-Fog gun. These numbers are those used by Spraying Systems Company of 4021 West Lake Street, Chicago, Illinois, and are catalog symbols of atomizing nozzles of 0.016, 0.020, 0.023, and 0.042 inches diameter of orifice. The number .60 (0.016 inches orifice) produced the best operational record on the basis of obtaining thorough spray coverage with a minimum of chemical solution. It was found that oil solutions of hormone sprays were easier to apply and would treat about twice the number of ribes bushes as an equal volume of water spray. The advantage of a light oil such as kerosene or fuel oil as a diluent for concentrates of hormone sprays is its low surface tension and low rate of evaporation as compared to water.

A 2-gallon compressed air sprayer mounting two separate cylinder tanks of equal size on a pack board was an object of study in comparison to the operation of the Hi-Fog gun. This two-cylinder unit, besides being about twice the weight of the Hi-Fog gun, dispersed 2 gallons of solution in less time than it took to effectively apply a 3-3/5-pint charge with the fog gun. Solution was placed in one of the cylinders and compressed air in the other. Air entered the top of the liquid cylinder forcing solution out around 25 pounds pressure at the bottom. The type of nozzle mounted delivered solution in a fan-shaped fashion. The unit had no practical value for spray work in this region in comparative tests with the Hi-Fog gun.

To simplify the presentation of chemical spray and dust tests, separate tables are given for work on each of the four North Idaho forests. The discussion



W-438

Hi-fog gun showing cylinder of 3 pint capacity, hydraulic pump, and solution intake hose. Pump handle is carried left of cylinder. 350 lb. nitrogen charge is located in cylinder top. Pressure of gun when fully charged is 1,000 lbs. Pipe extension for nozzle is 1/8-inch diameter and 36 inches long. 45 degree elbow on pipe mounts atomizing nozzle head. Weight of empty gun is 26½ lbs.



W-436

Hi-fog gun in operation showing position carried on back and how nozzle extension is held to direct mist spray over bush. Spray is being dispersed through a number .60 atomizing nozzle head.



commences with the work on the Clearwater Forest, table 4, and progresses northward with the St. Joe studies presented in table 5, Coeur d'Alene in table 6, and the Kaniksu in table 7. Decapitation tests for all forests are presented separately in table 8.

Clearwater Chemical Tests

Chemical spray and dust tests on the Clearwater Forest were initiated June 24 and 25. Fourteen plots were treated with various 2,4-D formulations during the two days. On July 21 and 22 fifteen plots were established using a salt and an ester of 2,4,5-T and an ester of 2,4-D in spray tests. Two plots were dust treated on July 25. On August 8 one plot each of the salt and the ester of 2,4,5-T in proportions of 1 to 4 of a diluent were treated as representative of late season hormone work. Table 4 summarizes all important data relative to chemical tests this season on the Clearwater Forest.

Plots 1 to 4 represent a series of tests with the ammonium salt of 2,4-D used in connection with King's formula. Glycerol in the amount of 6 ml. was added to the 1 gallon of 2,000 p.p.m. of ammonium salt solution for plot 1. Potassium chloride, ammonium phosphate and glycerol were included with 2,4-D in the amounts shown in the table for plots 2 and 4. Plot 3 was treated with the ammonium salt as a check on the inclusion of other chemicals. Ribes selected for treatment were mature fruiting bushes with large amounts of live stem. Plots were located along the Shanghai Ridge to Summit road. Chemical solution was applied with the knapsack sprayer. Along with these four spray plots a fifth was established using a 15 per cent sodium dust of 2,4-D. Air temperature on June 24 was in the upper seventies with scattered clouds but no showers during the day.

The June 25 series of nine plots was established along Hildebrand Creek about 1 mile upstream from Blister Rust Control Headquarters camp. These plots represented tests to determine whether the herbicidal action of the sodium salt of 2,4-D is increased by the addition of onion extract. Onion extract was added in the proportion of 1 to 20 for plots 7, 10, and 12, and in the proportion of 1 to 30 for plots 6, 9, and 13. Plots 8, 11, and 14 are checks on concentrations of 2,4-D. Size of plots was 1 milacre. The 1 gallon of solution per plot was applied with the knapsack sprayer. Average age of ribes on the fairly recent Hildebrand cutting was three years. Air temperature during the period of applying spray solution was in the upper seventies. A few scattered clouds were present in the forenoon. By midafternoon large thunderheads were developing. A light sprinkle fell about 3 hours after completing the spray work.

Plots 15 through 29 were established in Mutton Gulch on July 21 and 22. Five plots each of the three chemical formulations, the amine salt of 2,4,5-trichlorophenoxyacetic acid, the ethyl ester of 2,4,5-T, and a methyl ester of 2,4-D were used in the tests. Each formulation was added to a diluent in the proportions of 1:2, 1:4, 1:9, 1:19, and 1:39. The diluent for the amine salt of 2,4,5-T was water. The diluent for the ethyl ester of 2,4,5-T and the methyl ester of 2,4-D was kerosene. Solution was applied with the Hi-Fog gun mounting a number 1 nozzle. Plots were approximately 2 chains long and $\frac{1}{4}$ chain wide. Average age of ribes was 5 years. None had developed to the point of producing seed. Method of treatment was selective for those bushes readily seen and broadcast or screened

Habitats with known ribes present. For reasons of the latter technique ribes count as recorded may be slightly under actual numbers present although an effort was made to record all bushes however small. Air temperature during application was in the mid-eighties with skies clear.

Two dust plots, numbers 30 and 31, were established in Mutton Gulch on July 25. A 5 per cent isopropyl ester dust of 2,4-D was employed for this work. A small inexpensive type of garden duster was used for applying the isopropyl ester. Ribes on plot 30 averaged 6 years of age and on plot 31, 4 years of age. Fruit was being produced by ribes on plot 30 but none by ribes on plot 31. Air temperature during application was in the upper eighties with skies clear. Dust clung to the leaves of R. viscosissimum much better than to the slick surface of R. lacustre.

For tests representing late season hormone work, plots 32 and 33 were established in Mutton Gulch on August 8. In order to obtain a practical test in applying 2,4,5-T with the Hi-Fog gun, M. C. Riley, Operation Supervisor of the Clearwater Forest, agreed to provide two ordinary laborers for this job. These men had about 1 month of experience in using the Hi-Fog gun before being assigned to the plot work. Area of each plot was one-half acre subdivided into 6 strips, 3-1/3 chains long by 1 rod wide. Actual spray time for plot 32 was .65 man-days per acre and .50 man-days per acre for plot 33. Spray solution was applied selectively to the larger bushes which required little or no searching time. In cases where one or more small bushes were observed giving evidence that others might be present, the ribes habitat under suspicion was treated broadcast. The ethyl ester of 2,4,5-T in the proportion of 1 to 4 of the diluent kerosene was used for treatment of plot 32. The amine salt of 2,4,5-T in the proportion of 1 to 4 of the diluent water was applied to plot 33. Average age of ribes on the two plots was 5 years. Current year's growth development had been completed with a few basal leaves commencing to color at the date of treatment. Late September examination of these two plots showed evidence that spray coverage had not been thorough in the treatment of larger bushes.

TABLE 4

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS
ON RIBES, CLEARWATER NATIONAL FOREST

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species					
						vis.		lac.		pet.	
						No.	Bu.	FLS	No.	Bu.	FLS
6/24 1	Ammonium, 2,4-D + 6 ml. glycerol	Water	9.75 grams	2,000	1	9	235		2	115	
2	2,4-D + potassium chloride ammonium phosphate & 6 ml. glycerol		9.75 7.56 11.34	2,000 2,000 3,000	1	7	380		5	325	1 6
3	2,4-D		9.75	2,000	1	3	65		2	340	
4	2,4-D + potassium chloride ammonium phosphate & 3 ml. glycerol		4.88 3.78 5.67	1,000 1,000 1,500	1	19	370		2	35	
5	Dust - 15% sodium, 2,4-D	Frinite + Acid				4	110		1	50	
6/25 6	Sodium, 2,4-D	Water	1:30	10,000	1				20	35	
7		plus	1:20	2,000	1				30	18	
8		Onion		5,000	1				15	17	1 1
9		Extract	1:30	5,000	1				27	15	1 1
10			1:20	5,000	1				12	12	2 1
11				2,000	1				12	5	
12			1:20	10,000	1				9	29	
13			1:30	2,000	1				41	17	
14				10,000	1				24	12	
7/21 15	Amine salt of 2,4,5- trichlorophenoxyace- tic	Water	1:2	37,000	.375	1	6	95	120	1	1
16			1:4	22,000	.375			36	200		
17			1:9	11,100	.375			70	170		
18			1:19	5,500	.375			55	150		
19			1:39	2,250	.375			88	190		
20	Ethyl Ester 2,4,5- trichlorophenoxyace- tic acid	Kerosene	1:2	41,667	.375	2	23	44	118		
21			1:4	25,000	.375			42	195		
22			1:9	12,500	.375			34	150		
23			1:19	6,250	.375			37	63	1	2
24			1:39	3,125	.375			48	192		
7/22 25	Methyl Ester 2,4-D	Kerosene	1:2	38,667	.375			64	157	1	1
26			1:4	23,200	.375	4	7	57	122		
27			1:9	11,600	.375	1	1	42	40		
28			1:19	5,800	.375	1	1	30	62		
29			1:39	2,900	.375			27	175		
7/25 30	Dust - 5% isopropyl ester 2,4-D				1.4#	38	494	1	1		
31					1.5#	29	42	26	23	1	2
8/8 32	Ethyl Ester 2,4,5- trichlorophenoxyace- tic acid	Kerosene	1:4	25,000	.81	69	103	425			
33	Amine salt of 2,4,5- trichlorophenoxyace- tic	Water	1:4	22,000	.69	79	115	309		1	1

St. Joe Chemical Tests

Chemical tests were started on the St. Joe National Forest June 17 and carried through August 18. Ten plots were established June 17, nine being spray plots and the tenth a dust plot. On July 15 and 16 a series of 21 plots was treated. Plots numbering 11 through 19 in table 5 represented tests to determine whether herbicidal action of the salt of 2,4-D is increased by the addition of onion extract. Plots numbering 20 through 23 are the King's formula series of ammonium salt tests with the inclusion of other chemicals with 2,4-D. Plots numbering 24 through 31 are the series of 2,4,5-trichlorophenoxyacetic acid tests. These tests were replicated August 18 with the establishment of plots 32 through 46.

Plots 1 to 10 established June 17 were located along the Marble Creek road in the Corbett Creek drainage. Onion extract was added in the proportion of 1 to 20 of water for treatment of plots 1, 6, and 7. The proportion of 1 to 30 was used in treating plots 2, 3, and 4. Plots 5, 8, and 9 are chemical concentration checks of the sodium salt of 2,4-D. Each plot was 1 milacre in size. Solution was applied with the knapsack sprayer at the rate of 1 gallon per milacre except the .4 gallon treatment of plot 1. Plot number 10 was treated with a 5 per cent sodium dust of 2,4-D. Ribes were mature fruiting bushes with large amounts of live stem. Air temperature was in the lower seventies with considerable cloudiness from a rain storm preceding by a day or two the treatment of plots. Both air humidity and soil moisture were high.

The sodium salt of 2,4-D and onion extract tests were replicated in the Corbett Creek drainage July 15. These midseason tests are represented by plots 11 through 19. Age of ribes, plot size, and spray methods were identical to the June 17 tests. The only difference was that ribes were fully foliated with fruits mature and commencing to color at the July 15 date. Air temperature was in the lower eighties with skies clear. Plots 20 through 23 were established the same date in the Corbett Creek drainage. King's formula of the ammonium salt of 2,4-D with the addition of potassium chloride, ammonium phosphate and glycerol was used in these tests. Spray solution was applied at a dosage of 1 gallon per milacre with the knapsack sprayer.

On July 16 the first of the 2,4,5-T tests was made on the St. Joe Forest. For plots 24 through 27 the salt of 2,4,5-T was applied in proportions of 1:2, 1:4, 1:9, and 1:19 with water as a diluent. Plots 28 through 31 were treated with the ethyl ester of 2,4,5-T with kerosene as the diluent. Size of plots was 1 milacre. Plots were located along the Middle Fork of the St. Maries River near the mouth of Filer Creek. Solution was applied with the Hi-Fog gun mounting a number 1 atomizing nozzle head. Ribes were of mature age, fully foliated with fruits commencing to color. Air temperature was in the upper eighties. Sky was clear. Summer showers had preceded plot treatment by about 30 hours.

To represent late season applications of 2,4,5-T, plots 32 through 46 were established August 18. These were located in the Middle Fork drainage of the St. Maries River alongside the July 16 plots near the mouth of Filer Creek. Plots 32 through 36 were treated with the salt of 2,4,5-T with water as a diluent. Plots 37 through 41 were treated with the ethyl ester of 2,4,5-T with kerosene as a diluent. Plots 42 through 46 were also treated with the ethyl ester of 2,4,5-T with fuel oil as a diluent instead of kerosene. Solution was applied with the

Hi-Fog gun mounting the number 1 nozzle head. Size of plots was 1 milacre. Air temperature was around 85 degrees Fahrenheit with nights beginning to cool. Ribes were of a mature age and fully developed for the season. Fruits were ripe and commencing to fall. Fuel oil was considered equally as good as kerosene for a diluent of the ethyl ester of 2,4,5-T.

TABLE 5

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS
ON RIBES, ST. JOE NATIONAL FOREST

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species								
						vis.			lac.			pet.		
						No.	Bu.	FLS.	No.	Bu.	FLS.	No.	Bu.	FLS.
6/17 1	Sodium, 2,4-D	Water plus Onion Extract	1:20	2,000	.40	14	125							
2			1:30	1,000	1	21	95							
3			1:30	2,000	1	19	225							
4			1:30	5,000	1	33	185							
5			Check	2,000	1	8	115							
6			1:20	1,000	1	8	200							
7			1:20	5,000	1	19	115							
8			Check	1,000	1	16	80							
9			Check	5,000	1	56	165							
10	Dust, 5% Na. 2,4-D	Frianite	1:19			9	153							
7/15 11	Sodium, 2,4-D	Water plus Onion Extract	1:20	1,000	1	5	80							
12			1:20	2,000	1	3	135							
13			1:20	5,000	1	13	185							
14			1:30	1,000	1	11	220							
15			1:30	2,000	1	3	120							
16			1:30	5,000	1	8	350							
17			Check	1,000	1	8	230							
18			Check	2,000	1	7	100							
19			Check	5,000	1	28	150		2	5				
20	Ammonium, 2,4-D + potassium chloride ammonium phosphate & 3 ml. glycerol	Water	4.88	1,000	1	17	120							
			3.78	1,000										
			5.67	1,500										
			grams											
21	2,4-D + potassium chloride ammonium phosphate & 6 ml. glycerol		9.75	2,000	1	12	110		1	4				
			7.56	2,000										
			11.34	3,000										
22	2,4-D		9.75	2,000	1	11	130							
23	2,4-D + 6 ml. glycerol		9.75	2,000	1	15	200		2	40				
7/16 24	Amine salt of 2,4,5- trichlorophenoxyace- tic	Water	1:2	37,000	.05				4	120				
25			1:4	22,000	.07				6	170				
26			1:9	11,100	.11				8	300				
27			1:19	5,550	.09				10	100				

(continued on following page)

TABLE 5 (continued)

Plot No. & Date Treated	Type of Hormone Product	Diluent		P.P.M.	Gals. Spray Solu.	Ribes Species					
						vis.		lac.		pet.	
		Ratio				No. Bu.	FLS	No. Bu.	FLS	No. Bu.	FLS
7/16 28	Ethyl ester 2,4,5- trichlorophenoxyace- tic acid	Kerosene	1:2	41,667	.07			4	230		
29			1:4	25,000	.09			4	350		
30			1:9	12,500	.12			1	350		
31			1:19	6,250	.11			2	300		
8/18 32	Amine salt of 2,4,5- trichlorophenoxyace- tic	Water	1:2	37,000	.08			4	180		
33			1:4	22,000	.07			3	120		
34			1:9	11,100	.08			3	190	1	25
35			1:19	5,550	.11			3	230		
36	Ethyl ester 2,4,5- trichlorophenoxyace- tic acid	Kerosene	1:39	2,250	.06			1	160		
37			1:2	41,667	.16			9	280		
38			1:4	25,000	.07			1	150		
39			1:9	12,500	.12			5	250		
40		Fuel Oil	1:19	6,250	.14			6	200		
41			1:39	3,125	.12			4	150	2	13
42			1:2	41,667	.07			4	130		
43			1:4	25,000	.10			5	110		
44			1:9	12,500	.08			3	70		
45			1:19	6,250	.15			9	100		
46			1:39	3,125	.12			6	180		

Coeur d'Alene Chemical Tests

Initial tests with 2,4,5-T in the region were made on this forest commencing July 8. On this date eight plots were established in the Potter Creek drainage about one-half mile above the Forest Service brush camp. Ribes were 6 and 7 years of age originating on a 1941 cutting. Size of plots was 1 milacre wide and approximately $1\frac{1}{4}$ chains long. Plots 1 through 4 were treated with the amine salt of 2,4,5-T in the proportions 1:2, 1:4, 1:9, and 1:19 with the diluent water. Plots 5 to 8 were treated with the ethyl ester of 2,4,5-T with kerosene as a diluent. Solution was applied with the Hi-Fog gun mounting a number 1 atomizing nozzle head. Ribes were fully foliated with fruits mature but green. Air temperature was in the upper seventies with skies clear. As these plots were located on upland bordering stream type the moist habitat was occupied by the single species R. lacustre.

The July 8 tests were replicated by the establishment of a second series of plots July 15. Anhydrous sodium carbonate was added to the acid of 2,4,5-T to make the salt for treatment of plots 9 through 13. The concentration of parent acid employed was 1, 2, 3, and 5,000 p.p.m. Onion extract was added in the proportion of 1 to 20 for treatment of one of the two 2,000 p.p.m. tests. Solution was applied with the knapsack sprayer. Size of plots was 1 milacre. One gallon of solution was applied as an aerial and soil drench per plot. Plots are located on the up-hill side of the main Potter Creek haul-out road about $1\frac{1}{2}$ miles out from the Potter-Stewart Creek divide road. Average age of ribes is 6 years. They were fully foliated at the July 15 date with fruits mature and commencing to color.

Air temperature was in the upper seventies with a summer shower during the forenoon of the previous day. The onion extract was prepared by methods discussed under general summarization at the beginning of this section.

On the same date July 15, eight R. viscosissimum plots were treated, four with the ethyl ester of 2,4,5-T and four with the methyl ester of 2,4-D. The diluent in both cases was kerosene. These plots were located near the top of the Potter-Stewart Creek divide about one-third mile out on logging road No. 1. For the reason ribes were selectively treated, plot size varies from one-tenth to one-fifth acre depending upon the number of bushes sprayed with the full 3-3/5 pint charge of the Hi-Fog gun. Average age of ribes was 6 years. Bushes were fully foliated with fruit mature and commencing to show slight coloring. Photo W-452, plate V shows the condition of R. viscosissimum bushes 51 days after treatment. Bushes in the immediate foreground were treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 4 of the diluent kerosene. Heavy concentration of ribes in skid trail is a result of mechanical disturbance of the forest floor by log skidding with a caterpillar.

The last three days in July were devoted to the treatment of nineteen spray plots and one dust plot. The ethyl ester of 2,4,5-T in kerosene was applied to plots 22 through 26. Plots 27 through 31 were treated with the methyl ester of 2,4-D in kerosene. The amine salt of 2,4,5-trichlorophenoxyacetic acid was applied to plots 32 through 36. A five per cent isopropyl ester dust of 2,4-D was used to treat plot 37. Two spray mist drift plots were included in this series of tests. Plot 38 was treated with the methyl ester of 2,4-D and plot 39 with the ethyl ester of 2,4,5-T. All plots are located on the uphill side of logging road No. 1 except two below road, and are about 1 mile out from the junction of the Potter-Stewart Creek main haul-out road. Size of plots varies from one-fifth to two-fifths acres depending upon the number of ribes treated with two full charges, 7-1/5 pints, of the Hi-Fog gun. Ribes were fully foliated with fruits of R. lacustre ripe and those of R. viscosissimum within 10 days of being ripe. Average age of ribes was 6 years. Air temperature during the 3 days was in the lower eighties with skies clear.

A number of photographs are presented to show stages of injury from hormone sprays. Plate II illustrates the rapidity of chemical injury 24 hours after treatment. The R. lacustre bush in W-477 was treated the previous day with the ethyl ester of 2,4,5-T at 1 to 4 of kerosene. The R. lacustre bush in W-473 was treated with the methyl ester of 2,4-D at a ratio of 1 to 4 of kerosene. Injury by the latter chemical in 24 hours is much faster than with 2,4,5-T. Foliage of both bushes is typical of injury from these hormones the day of treatment or by the following day.

Plate III and the top photo on plate IV show typical condition of bushes treated with 2,4,5-T about 5 weeks after application. The R. viscosissimum bush in W-475, plate III, was treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 4 of kerosene on July 29. All live stem was dead but cambium was green in root crown September 4, the date the picture was taken. In W-474, a clump of R. lacustre treated with the ethyl ester of 2,4,5-T in the proportion of 1 to 2 parts of kerosene can be observed along side of logs. This clump was treated July 29 and the picture taken September 4. All live stem was dead at the latter date but cambium in root crowns and a short distance up basal stems was green.

No resprouts had appeared at the September date or by the 22nd of October. Photo W-476 on plate IV shows a R. lacustre bush sprayed with the amine salt of 2,4,5-trichlorophenoxyacetic acid on July 30 and its condition September 4. The proportion of 2,4,5-T to water was 1 to 4 for treatment of this bush. Injury is very slow. Leaves begin to take on fall colors about the third week after treatment. Green color in cambium gradually fades to a yellow-brown as live stem begins to die toward the root crown. At no time during the season of treatment was there any indication that death might result from applying the salt of 2,4,5-T in aqueous solution.

To answer the question whether a mist spray can be drifted onto a bush with favorable results one has only to glance at photo W-461 for the answer. Plots 38 and 39 represent treatments in which mist spray was drifted over ribes bushes with the Hi-Fog gun. The two plots were established along a road bank so it was possible to walk along above them and get the mist to carry down slope. The bush in the picture is typical of spot injury resulting from incomplete coverage with spray solution. Healthy leaves can be seen at the tops of some stems as well as throughout the aerial crown. This type of treatment from the ground results in a hit and miss proposition and cannot be depended upon in the application of hormone sprays. No bush kill will be obtained unless stems and leaves are thoroughly covered with spray solution.

Low concentration of parent acid results in about the same bush condition as incomplete coverage with spray solution. Photo W-481 on plate V shows the status of a number of R. viscosissimum bushes the fifth week after being sprayed with the ethyl ester of 2,4,5-T in the proportion of 1 to 19 of kerosene. Leaves from some of the live stem have fallen but others remain on the plants with varying degrees of injury. These bushes treated with low chemical concentration appear much as the bush in photo W-461 treated with a mist concentrate by wind drifting solution onto the bush.

To complete the July 29 to 31 series of tests, two plots were established in a stream bottom for the treatment of R. lacustre on a moist habitat. These two plots are located at the junction of logging road No. 5 and the main Potter Creek road about $1\frac{1}{2}$ miles below the Ohio Match Logging Camp No. 40. Plot 40 was treated with the methyl ester of 2,4-D and plot 41 with the ethyl ester of 2,4,5-T. The chemical concentration for both plots was 1 to 4 parts of kerosene. Average age of ribes was 5 years. Air temperature was in the upper eighties and skies were clear. An October inspection of these plots showed resprouting from the 2,4-D treatment but none from the application of 2,4,5-T.

A series of late season tests on the Coeur d'Alene Forest is represented by plots 42 through 45. These were established September 3 in the same location as the July 29 to 31 series. Plots 42 and 43 were treated with the ethyl ester of 2,4,5-T in proportion of 1:2, and 1:4 with kerosene. The methyl ester of 2,4-D in identical proportions as the above with kerosene was applied to plots 44 and 45. Stronger chemical concentrations were the only strengths replicated because of the rapidly approaching fall season. Ribes were beginning to drop lower leaves. All fruit had fallen two to three weeks prior to chemical treatment. Air temperature had dropped to the lower seventies. Skies were clear on the day of treatment. Night temperature was in the higher thirties with frost appearing in meadows along streams.

PLATE II



Ribes lacustre bush showing chemical injury 24 hours after treatment with ethyl ester of 2,4,5-T in kerosene at 1:2. Date of application, September 3, 1947.



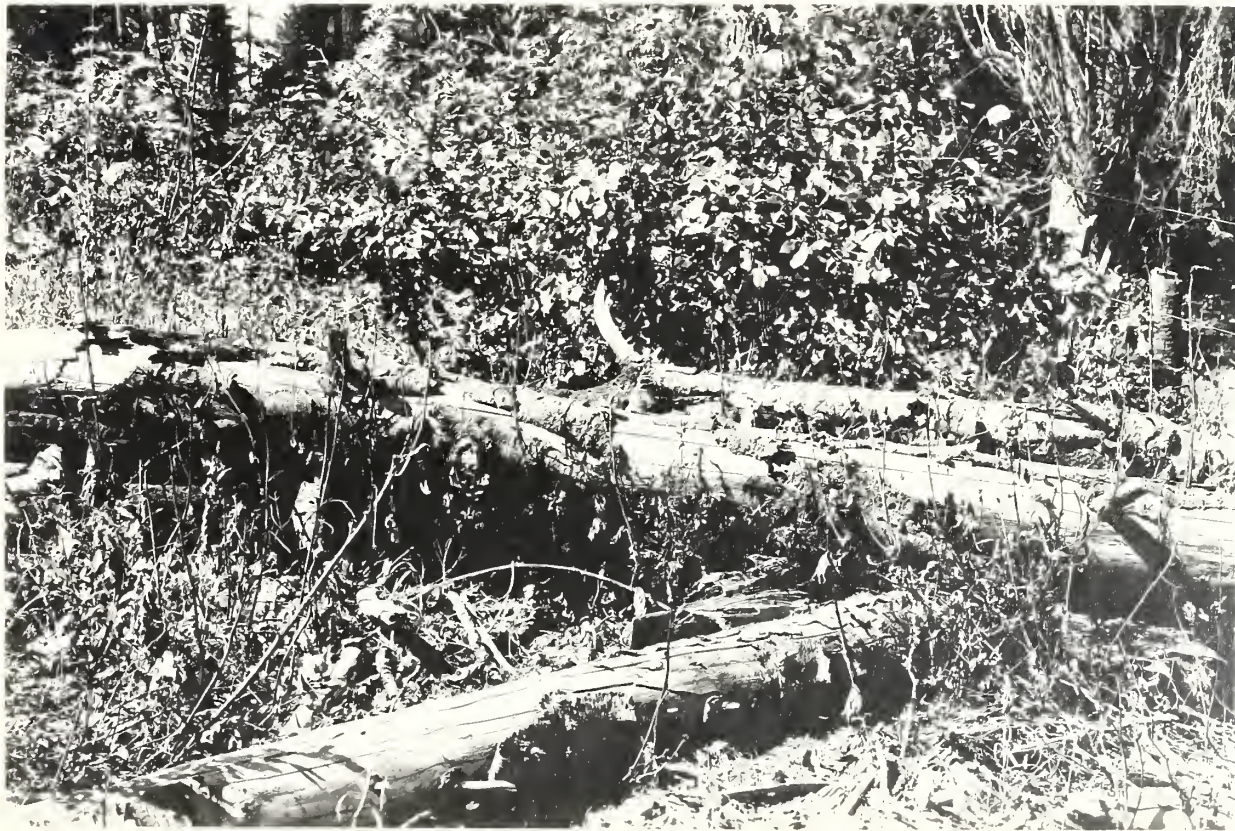
Ribes lacustre bush showing chemical injury 24 hours after treatment with methyl ester of 2,4-D in kerosene at 1:2. Date of application, September 3, 1947.





W-475

Ribes viscosissimum bush 38 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:4. Date of application July 29. Live stem is dead to root crown, no resprouting season of treatment.



W-474

A clump of P. lacustre along logs 38 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:2. Date of application, July 29, 1947. Live stem dead to root crown, no resprouting season of treatment.





W-476

Ribes lacustre bush 36 days after treatment with amine salt of 2,4,5-T acid in water at 1:4. Date of application, July 31, 1947. Stem and crown cambium discolored and spongy but still functioning, no resprouting season of treatment.



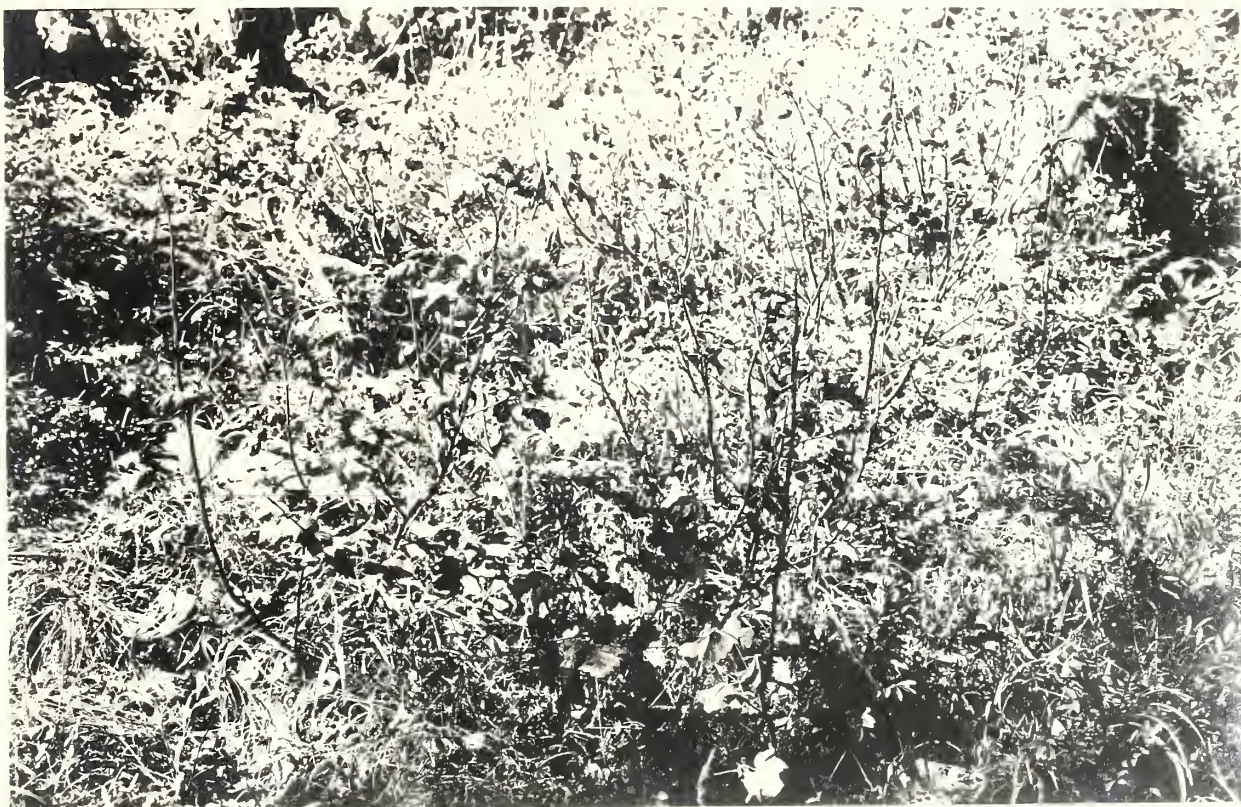
W-461

Ribes viscosissimum bush 38 days after treatment showing effects of incomplete spray coverage resulting from an attempt to drift chemical solution as a mist onto the bush from about 4 feet distance. Bush treated with the ethyl ester of 2,4,5-T in kerosene at 1:4. Date of application, July 29, 1947. Leaves and live stem affected only where thorough coverage was obtained in drifting mist spray onto the bush.



W-452

A concentration of *R. viscosissimum* on skid trail 51 days after treatment with the ethyl ester of 2,4,5-T in kerosene. Chemical concentration in lower foreground 1:4 and upper foreground 1:9. Date of application, July 15, 1947. All live stem in 1:4 treatment dead to root crown, no resprouting season of treatment.



W-481

A concentration of *R. viscosissimum* in skid trail 58 days after treatment with the ethyl ester of 2,4,5-T in kerosene at 1:19. Bushes show incomplete live stem kill resulting from using too low a chemical concentration for July 29, 1947 treatment. Typical of all 2,4,5-T tests, no resprouting occurred the season of treatment.



TABLE 6

1947 CHEMICAL SPRAY AND DUST TESTS OF HORMONE FORMULATIONS
ON RIBES, COEUR D'ALENE NATIONAL FOREST

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species					
						vis.			lac.		
						No.	Bu.	FLS	No.	Bu.	FLS
7/8	1	Water	1:2	37,000	.19				45	120	
	2		1:4	22,200	.20				50	48	
	3		1:9	11,100	.16				65	168	
	4		1:19	5,550	.16				17	30	
	5	Kerosene	1:2	41,667	.19				7	14	
	6		1:4	25,000	.20				41	32	
	7		1:9	12,500	.16				63	78	
	8		1:19	6,250	.23				122	177	
7/15	9	Water		1,000	1	5	40		22	360	
	10			2,000	1	9	16		25	52	
	11		1:20	2,000	1	3	90		13	98	
	12			3,000	1	10	150		10	78	
	13			5,000	1	2	18		17	78	
	14	Kerosene	1:2	41,667	.375	92	610				
	15		1:4	25,000	.375	95	775				
	16		1:9	12,500	.375	86	1,380				
	17		1:19	6,250	.375	104	1,020				
	18	Methyl ester of 2,4- dichlorophenoxyacetic acid	1:2	38,667	.375	113	1,200				
	19		1:4	23,200	.375	127	1,025				
	20		1:9	11,600	.375	121	985				
	21		1:19	5,800	.375	104	925				
7/29	22	Kerosene	1:2	41,650	.75	16	28	87	1,985		
	23		1:4	25,000	.75	67	385	113	1,740		
	24		1:9	12,500	.75	93	385	68	1,030		
	25		1:19	6,250	.75	112	470	22	355		
	26		1:39	3,125	.75	103	395	27	320		
	27	Methyl ester of 2,4- dichlorophenoxyacetic acid	1:2	38,667	.75	104	415	47	670		
	28		1:4	23,200	.75	96	365	39	410		
	29		1:9	11,600	.75	113	590	31	385		
	30		1:19	5,800	.75	101	565	37	425		
	31		1:39	2,900	.75	94	510	22	335		
7/30	32	Water	1:2	37,000	.75	107	715	51	735		
	33		1:4	22,000	.75	112	760	36	480		
	34		1:9	11,100	.75	102	690	39	465		
	35		1:19	5,500	.75	95	735	23	290		
	36		1:39	2,250	.75	109	805	17	185		
	37	Dust - 5% isopropyl ester 2,4-D "Esteron"				44	210	58	885		
	38	Methyl ester 2,4-D applied as drift spray	Kerosene	1:4	23,200	.375	64	335	31	415	

(continued on following page)

TABLE 6 (continued)

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species					
						vis.			lac.		
						No.	Bu.	FLS	No.	Bu.	FLS
7/30 39	Ethyl ester 2,4,5-T applied as drift spray	Kerosene	1:4	25,000	.375	74		460	23		245
7/31 40	Methyl ester of 2,4- dichlorophenoxyacetic acid	Kerosene	1:4	23,200	.375				53		735
41	Ethyl ester of 2,4,5- trichlorophenoxyacetic acid		1:4	25,000	.375				47		690
9/3 42	Ethyl ester of 2,4,5- trichlorophenoxyacetic acid	Kerosene	1:2	41,667	.75	87		380	63		565
43			1:4	25,000	.75	76		345	54		510
44	Methyl ester of 2,4- dichlorophenoxyacetic acid		1:2	38,667	.75	61		370	78		635
45			1:4	23,200	.75	57		385	52		490

Kaniksu Chemical Tests

Tests on this forest were not initiated until August 6. All applications are to be considered as late season tests. Ribes leaves were beginning to develop a leathery texture and show spotting of fall colors. Fruiting was at a peak with the majority of berries dropping by August 20. Chemical spray plots 1 to 4 were established August 6, plots 5 to 8 on August 7, and plots 9 to 12 on August 12. These 12 plots represented the major series of tests being replicated on the 4 north Idaho forests. On August 14 plots 13 to 16 were established employing fuel oil as a diluent for the esters of 2,4,5-T and 2,4-D. A low stem type of treatment was employed the same date for plots 17 to 20. On August 18 two plots, 21 and 22, were treated with the butyl ester of 2,4-D in kerosene. On the same date plot 23 was established using the 2-gallon compressed air sprayer to apply the solution. Two R. inerme plots were established on August 19 in stream type. On August 25 four plots were established on a stream bench for the purpose of treating stream type R. lacustre. Plot records for the Kaniksu are shown in table 7.

Plots 1 to 4 were sprayed with the ethyl ester of 2,4,5-T in kerosene. Plots 5 to 8 were sprayed with the methyl ester of 2,4-D with kerosene as a diluent. The amine salt of 2,4,5-trichlorophenoxyacetic acid was used to treat plots 9 to 12. Again size of plot varied with the number of ribes bushes which could be treated with two full charges, 7-1/5 pints, of the Hi-Fog gun. Their size ranged from one-fifth to two-fifths acres. Plots were located at the head of the La Clerc Creek drainage. Average age of ribes was 7 years. Air temperature on the three days of plot treatment was in the lower eighties with skies mostly clear.

For plots 13, 14, 15, and 16, fuel oil was used as a diluent for the hormone sprays instead of kerosene. The ethyl ester of 2,4,5-T was applied to plots 13 and 14, and the methyl ester of 2,4-D to plots 15 and 16. Tests with fuel oil

were made to determine how satisfactory this cheaper product would be as a diluent in comparison to kerosene. The proportions of 1:4 and 1:9 were the only chemical concentrations employed in this test. Fuel oil proved to be just as good a diluent of chemical sprays as kerosene. In fact being slightly heavier than kerosene, the Hi-Fog mist was easier to control in wind.

Some success had been reported from California in limiting the application of chemical spray to the basal portions of stems. Plots 17 through 20 were thus established to determine the effectiveness of low stem treatment. Chemical spray was applied to a bush height of 1 foot. On smaller bushes many or all leaves were sprayed as no attempt was made to limit treatment entirely to stem growth. Those bushes which exceeded 1 foot in height growth were stem treated except for an occasional leaf within the zone of application. Plots 17 and 18 were treated with the ethyl ester of 2,4,5-T in kerosene and plots 19 and 20 with the methyl ester of 2,4-D in kerosene. Spray time involved in basal stem treatment was about half that required to cover leaves and stems.

As tests had never been undertaken in this region to determine the effectiveness of the butyl ester of 2,4-D in a diluent such as kerosene, two plots, 21 and 22, were established to obtain comparative results with previous tests of an aqueous solution. These two plots were treated August 18. On the same date plot 23 was established using the 2-gallon compressed air sprayer previously described to apply the chemical solution. Besides dispersing the 2 gallons in less time than the 3-3/5 pint charge of the Hi-Fog gun with a number .60 nozzle, it was found more difficult to obtain thorough coverage of leaves and stems with the compressed air sprayer than with the mist type spray of the Hi-Fog gun.

Plots 24 and 25 were established to obtain comparative tests of 2,4,5-T and 2,4-D in the treatment of stream type R. inerme. These plots and the four, 26 to 29, are located on Lamb Creek about one-half mile above the strawberry ranch. Plot 24 was treated with the ethyl ester of 2,4,5-T and plot 25 with the methyl ester of 2,4-D. The diluent for both chemicals was kerosene in the proportion of 1 part chemical concentrate to 4 parts of the diluent. Average age of ribes bushes in these stream type plots was 8 years. Bushes were open grown on area which had been bulldozed of all brush in the late thirties. Chemical solution was applied with the Hi-Fog gun which proved highly desirable for mop-up work in stream type. Air temperature was in the lower eighties with skies clear the day of treatment.

On a stream bench inhabited by stream type R. lacustre in the Lamb Creek drainage a short distance from the R. inerme tests, plots 26 to 29 were treated on August 25. These were established to check the comparative effectiveness of hormone sprays on upland and stream type R. lacustre. Plots 26 and 27 were treated with the ethyl ester of 2,4,5-T in kerosene and plots 28 and 29 with the methyl ester of 2,4-D. Average age of ribes on this stream bench was 6 years. All fruit had fallen and many of the lower stem leaves were commencing to turn fall colors at the date of plot treatment. Air temperature was in the upper seventies. Skies were partly cloudy. About 2 hours' rain had fallen the night of August 23.

TABLE 7

1947 CHEMICAL SPRAY TESTS OF HORMONE FORMULATIONS
ON RIBES, KANIKSU NATIONAL FOREST

Plot No. & Date Treated	Type of Hormone Product	Diluent	Ratio	P.P.M.	Gals. Spray Solu.	Ribes Species					
						vis.		lac.		inerm	
						No. Bu.	FLS	No. Bu.	FLS	No. Bu.	FLS
8/6	1 Ethyl ester of	Kerosene	1:2	41,667	.75	263	1,125	37	195		
	2 2,4,5-trichloro-		1:4	25,000	.75	237	1,080	26	162		
	3 phenoxyacetic acid		1:9	12,500	.75	281	1,340	48	238		
	4		1:19	6,250	.75	242	1,125	43	203		
8/7	5 Methyl ester of	Kerosene	1:2	38,667	.75	338	1,450	64	311		
	6 2,4-dichloro-		1:4	23,200	.75	317	1,210	56	205		
	7 phenoxyacetic acid		1:9	11,600	.75	342	1,380	69	318		
	8		1:19	5,800	.75	263	1,065	44	200		
8/12	9 Amine salt of	Water	1:2	37,000	.75	187	990	51	320		
	10 2,4,5-trichloro-		1:4	22,000	.75	213	1,045	77	380		
	11 phenoxyacetic		1:9	11,100	.75	237	1,150	63	290		
	12		1:19	5,500	.75	209	1,085	67	305		
8/14	13 Ethyl ester of	Fuel Oil	1:4	25,000	.75	233	1,175	41	238		
	14 2,4,5-T acid		1:9	12,500	.75	288	1,130	55	278		
	15 Methyl ester of		1:4	23,200	.75	261	1,015	47	220		
	16 2,4-D acid		1:9	11,600	.75	217	985	38	193		
	17 Ethyl ester of	Kerosene	1:4	25,000	.75	203	1,135	52	246		
	18 2,4,5-trichloro-		1:9	12,500	.75	219	1,165	61	282		
	phenoxyacetic acid (Low stem treatment)										
	19 Methyl ester of		1:4	23,200	.75	264	1,260	73	310		
	20 2,4-dichloro-		1:9	11,600	.75	292	1,415	87	362		
	phenoxyacetic acid (Low stem treatment)										
8/18	21 Butyl ester of 2,4-	Kerosene	1:4	64,000	.75	248	1,235	107	416		
	22 dichlorophenoxy-		1:9	32,000	.75	223	1,205	94	392		
	acetic acid										
	23 Ethyl ester of		1:4	25,000	2.00	138	890	64	278		
8/19	24 Ethyl ester of	Kerosene	1:4	25,000	.75					93	560
	2,4-dichloro-										
	phenoxyacetic acid										
	25 Methyl ester of		1:4	23,200	.75					87	535
8/25	26 Ethyl ester of	Kerosene	1:4	25,000	.75			81	735		
	27 2,4,5-trichloro-		1:9	12,500	.75			76	710		
	phenoxyacetic acid										
	28 Methyl ester of		1:4	23,200	.75			87	955		
	29 2,4-dichloro-		1:9	11,600	.75			94	920		
	phenoxyacetic acid										

Ribes Decapitation Tests

Prior to the 1947 field season Ammate had been used in ribes decapitation work for the treatment of cut stem and root surfaces. One of its disadvantages is that large amounts must be carried for a day's work. It was found that a liquid concentrate of 2,4-D was as effective as Ammate and could be carried in a small oil can in the hip pocket. This chemical was thus adopted by the control operations in 1947 for treatment of cut stem and root surfaces in the decapitation of ribes.

Decapitation tests were expanded this past season to determine (1) the relationship between chemical concentration and bush kill, and (2) location of cut and treated surface in respect to stem height above root crown and bush kill. A 40 per cent butyl ester of 2,4-D diluted to 5, 10, and 20 per cent concentrations in water was used in these tests. Types of cut surfaces made in decapitating aerial portions of ribes were (1) cut made directly through crown, (2) stems cut 1 inch above crown, (3) stems cut 2 inches above crown, and for treatment of R. viscosissimum (4) stems cut 3 inches above crown. To each cut surface a few drops of the liquid 2,4-D concentrate were applied through the snout of the oil can. Data for the 28 ribes decapitation plots are shown in table 8.

Plots 1 to 16 on the Coeur d'Alene Forest were the first series of decapitation tests established in the region. These are located on the uphill side of logging road No. 1 about one-half mile out from the Potter-Stewart Creek main divide road. They are in the vicinity of the Potter Creek spray plots. Average age of ribes for these tests was 7 years. The decapitation series was represented by treatment with three chemical concentrations and a check on location of cut surface in respect to stem height above root crown. Ribes were fully foliated at the July 14 date of treatment. Fruits were mature and commencing to show some ripening color. Bushes were decapitated with hand pruners. The single species R. viscosissimum was the only one included in these tests.

To obtain similar tests with R. lacustre a series of decapitation plots was established on the St. Joe Forest. These are located near the mouth of Filer Creek, a tributary of the Middle Fork of the St. Maries River. Bushes were 6 to 8 years of age. The three concentrations of butyl ester of 2,4-D were employed for treatment of cut stem surfaces. Height of cut was identical to the R. viscosissimum plots on the Coeur d'Alene Forest except the 3-inch stem height was dropped. Ten bushes were treated for each test with each bush having from 3 to 8 feet of live stem.

TABLE 8

1947 DECAPITATION TESTS APPLYING 2,4-D TO CUT STEM SURFACES OF
R. LACUSTRE AND R. VISCOSISSIMUM

Plot No. & Date Treated	Forest	Type of 2,4-D Product	Per Cent	Type of Decapitation	Ribes Species		
						No. Bushes	Feet Live Stem
7/14	1	Coeur d'Alene	5%	Through crown	vis.	37	725
	2			1" above crown	vis.	54	860
	3			2" above crown	vis.	53	825
	4			3" above crown	vis.	48	900
	5		10%	Through crown	vis.	37	930
	6			1" above crown	vis.	34	780
	7			2" above crown	vis.	47	1,075
	8			3" above crown	vis.	33	850
	9		20%	Through crown	vis.	30	825
	10			1" above crown	vis.	31	870
	11			2" above crown	vis.	36	940
	12			3" above crown	vis.	57	1,150
	13	No chemical	Check	Through crown	vis.	30	735
	14			1" above crown	vis.	38	775
	15			2" above crown	vis.	31	840
	16			3" above crown	vis.	37	750
8/1	17	St. Joe	5%	Through crown	lac.	10	51
	18			1" above crown	lac.	10	34
	19			2" above crown	lac.	10	69
	20		10%	Through crown	lac.	10	61
	21			1" above crown	lac.	10	33
	22			2" above crown	lac.	10	209
	23		20%	Through crown	lac.	10	64
	24			1" above crown	lac.	10	92
	25			2" above crown	lac.	10	89
	26	No chemical	Check	Through crown	lac.	10	47
	27			1" above crown	lac.	10	82
	28			2" above crown	lac.	10	57

DEVELOPMENTAL WORK IN DISEASE SURVEY METHODS: A PROGRESS REPORT ON A STUDY OF THE DIFFERENCE IN DAMAGE ESTIMATES BASED ON NUMBERS OF TREES LOST AND ON NUMBERS OF STOCKED QUADRATS DEPOPULATED DUE TO BLISTER RUST

INTRODUCTION AND PURPOSE OF THE STUDY

It has been realized for some time that the tendency for natural western white pine reproduction to become established in scattered and often dense clumps might have an important effect on the choice of a method for the evaluation of losses caused by the blister rust disease. Surveys and other disease studies designed to appraise such losses have, heretofore, supplied information on the numbers of white pines lost rather than on the numbers of units of growing space (stocked quadrats) depopulated by blister rust^{1/}. In white pine stands of all ages below maturity, the examiner may find many relatively dense clumps of trees in which rust damaged pines are being adequately replaced by healthy or harmlessly infected pines of equal dominance and chance for survival. Were the stand composed of two such trees close enough together on the ground so that growing space was sufficient for but one 50 years hence, or at maturity, then the stand estimated 50 per cent damaged on the basis of lost trees is actually uninjured. One surviving tree adequately stocks the unit of area.

This study was undertaken to determine whether measurable differences existed between losses attributable to blister rust as estimated by the methods now in use and as estimated by a modification of the stocked quadrat method. The effects of stocking intensity, rust intensity, and stand age on rust damage in general and on the differences in rust damage as estimated by the two methods were also to be considered.

Valuable assistance in determining quadrat sizes for the various age classes of western white pine was given by Mr. C. A. Wellner, Silviculturist, Northern Rocky Mountain Forest and Range Experiment Station. Mr. A. W. Slipp, Assistant Professor of Forestry (in charge, University of Idaho School of Forestry - Bureau of Entomology and Plant Quarantine - Forest Service cooperative blister rust study) made available summarized data useful in judging potentially damaging blister rust cankers.

METHODS

1. Selection of Plots and Determination of Plot Size

On the Clearwater, St. Joe, and Coeur d'Alene National Forests, square sample plots on moderately good to good sites (Site index 60 to 70) were selected from within a range of 33 combinations of the variates age class of white pine, stocking intensity of white pine, and intensity of existing rust infection as shown in the following table:

^{1/} For an informative discussion of the stocked quadrat concept see: Munger, Thornton T., Stocked Quadrats vs. Number of Trees as a Basis for Classifying Reforesting Land. Pac. N.W. For. Expt. Sta. Res. Notes 33: 2-7; Jan. 1945.

Age Class	Stocking Intensity (% quadrats stocked with white pine crop trees)	Rust Intensity (% white pine crop trees infected)
0-10	Light, 0.0 - 33.3	Light, 0.0 - 33.3
11-20	Medium, 33.4 - 66.7	Medium, 33.3 - 66.7
21-40		
41-60	Heavy, 66.8 - 100.0	Heavy, 66.8 - 100.0

Number
Variables 4 x 3 x 3 = 36 combinations

In the 0-10 year age class, plots meeting the specification of heavy rust intensity were not to be found since the number of years necessary to produce heavy rust on pine is usually more than 10. This reduced the number of possible combinations of the three variates to 33. Trees 20 years old and younger were divided into two age classes due to greater vulnerability to rust damage characteristic of the youngest (0-10 year) class. Under conditions of equal rust intensity younger trees are, presumably, more vulnerable to blister rust because of their relatively greater proportion of low, well-needed trunks and short branches.

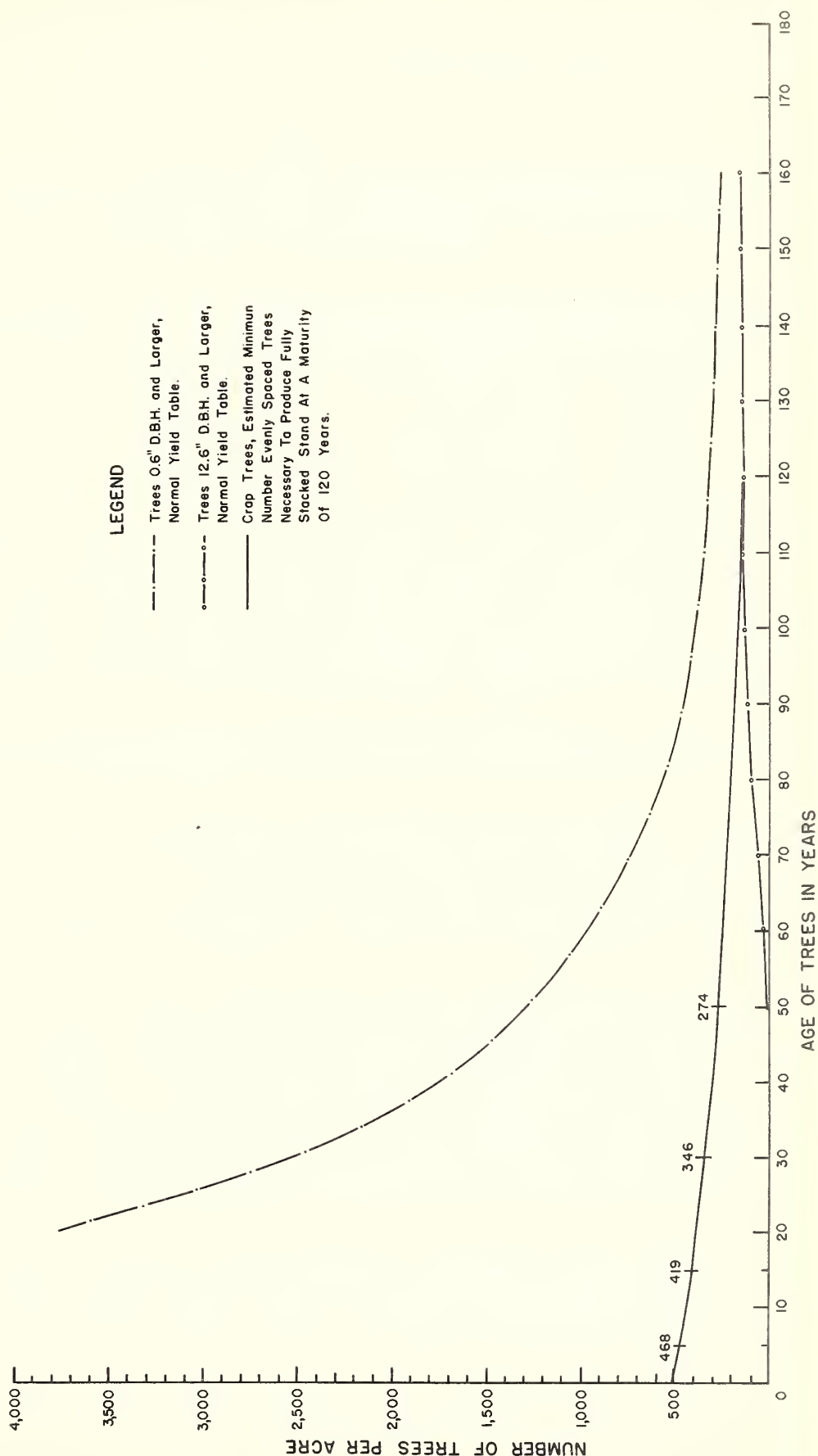
Plots varied in size with age class but always contained the uniform number of 100 square sub-plots or quadrats. Quadrats were of a size estimated to be approximately the area which in the age class being investigated should be stocked with at least 1 white pine crop tree in order to fulfill a full stocking requirement at maturity (120 years).

Figure 1 shows the method by which quadrat sizes were computed. The solid line curve represents Wellner's estimation of the minimum number of evenly distributed white pine crop trees per acre necessary at any given age to produce a fully stocked stand at maturity. The curve based on Haig's^{1/} normal stand table values, site index 65, shows that in the younger age classes large numbers of trees 0.6 inches D.B.H. and over are required to produce fully stocked stands at maturity. The estimated curve starts at 0 years with a requirement of only 500 evenly distributed trees per acre. The two curves never coincide because, from the earliest age, the 0.6 inch D.B.H. curve undoubtedly includes unevenly distributed crop trees located in dense clumps of trees, plus intermediate and suppressed non-crop trees. A further comparison of the estimated curve with the normal stand table curve for trees 12.6 inches and over (perhaps similar to the dominant and codominant crop trees in stands near maturity) shows closer agreement as the maturity age is approached.

Estimated minimum numbers of evenly spaced crop trees necessary to produce fully stocked stands at maturity were obtained for the age classes from the solid line

^{1/} Haig, Irvine T. Second-growth yield, stand, and volume tables for the western white pine type. U.S.D.A. Tech. Bull. 323: 1-67; Oct. 1932.

FIGURE 1. NORMAL YIELD TABLE AND ESTIMATED STOCKING CURVES FOR NUMBERS OF TREES PER ACRE TO PRODUCE FULLY STOCKED WESTERN WHITE PINE STANDS AT MATURITY.
(SITE INDEX 65)





curve of figure 1. Quadrat sizes were then calculated for the midpoints of the four age classes being investigated, i.e., 5, 15, 30, and 50 years, as given in table 1.

TABLE 1

NUMBER OF EVENLY SPACED WESTERN WHITE PINE TREES PER ACRE AS OBTAINED FROM THE ESTIMATED STOCKING CURVE WITH CORRESPONDING SIZES OF QUADRATS AND NUMBER OF ACRES PER PLOT

Age Class (Years)	Estimated No. Evenly Spaced Crop Trees Per Acre for Full Stocking	Calculated Quadrat Size (Feet)	Acres Per Plot (100 Quadrats)
0-10	468	9.7 x 9.7	0.216
11-20	419	10.2 x 10.2	0.239
21-40	346	11.4 x 11.4	0.289
41-60	274	12.6 x 12.6	0.364

A plot in the 11-20 year age class would thus measure 102 feet square (ten 10.2 feet square quadrats on a side) and would be slightly less than $\frac{1}{4}$ of an acre in size. It would be considered fully stocked when each of its 100 quadrats contained one or more white pine crop trees. Quadrat areas as calculated from the estimated stocking curve were larger than individual white pine crop tree growing space requirements at all ages short of maturity. Thus, there was adequate growing space for more than one crop tree on a single quadrat.

2. Determining Blister Rust Damage as Measured by the Percentage of White Pine Crop Trees Lost Due to Blister Rust

Trees of all species on each of the 100 plot quadrats were examined. Quadrat crop trees were designated on the basis of state of canopy closure, tolerance and expected future growth rate for the species, and present tree dominance and position. Trees which on the basis of this examination were designated as crop trees were those which might be expected to remain, or to have an equal chance of remaining, in the stand at maturity.

All white pine crop trees on the plot quadrats were closely scrutinized for infection. Trees with trunk cankers were automatically recorded as damaged or lost. When branch cankers only were found, basic measurements including branch diameter, remaining distance to trunk, and length of internodes between canker and trunk were recorded for the 5-(or less) cankers closest to but within 24 inches of trunk. These threatening cankers were then adjudged either harmless or potentially damaging according to data accumulated by R. L. MacLeod, supplemented by data obtained from the detailed records of the University of Idaho blister rust study.

MacLeod's measurements were made on the internodal distances that cankers crossed in their spread toward trunk, using 720 carefully selected cankers which had died before reaching trunk. They are shown in condensed form on the following page.

Cankered Branch Diameter Class (Inches)	Length of Longest Internode(s) ^{1/} Crossed by Canker in Spread Toward Trunk (Inches)
0 - $\frac{1}{4}$	3
$\frac{1}{4}$ - $\frac{1}{2}$	6
$\frac{1}{2}$ - $\frac{3}{4}$	6
$\frac{3}{4}$ - 1	6
1 - $1\frac{1}{4}$	9

Possible weaknesses in the method of selecting and measuring cankers after death are apparent. By the time the cankers were measured it might no longer have been possible to make reliable measurements on the length of the internode(s) crossed. Many if not all of the lateral branches which contributed to canker development might have been dead. To check MacLeod's mean values they were compared with the means of similar measurements made on the periodically inspected cankers under observation in the University study. Interpretations based on data from the latter study are the author's.

Approximately 1350 blister rust cankers and the branches which support them are now under annual observation in the University study. During the 8 years since the earliest of these cankers originated more than one-third have already died. The most common cause of death was the death of supporting branches caused by flagging of other cankers on the same branches which originated closer to the trunk. However, 116 of the dead cankers were capable of reaching trunk unhindered by other cankers nearer to trunk or by other influences such as death of the entire tree caused by injuries or the action of other fungi and insects. Potentially, each of these cankers was capable of damaging the tree, a threat eliminated by canker death. In most cases the detailed records on condition of cankered branches and on canker development gave a clear picture of the cause of death of the threatening cankers. Suppression of cankered branches accounted for the death of 35 of the 116 cankers. The remainder died as a result of branch flagging caused by a variety of factors including normal canker girdling, accelerated girdling caused by secondary fungi attacking cankered tissues and girdling by rodents gnawing cankered tissues. The cause of death, internodal spread, average number of nodes crossed, and months of canker life are shown for cankers on branches of various diameters in Table 2 on the following page.

A comparison of the University study data with MacLeod's data shows that the average lengths of longest internode(s) crossed by cankers prior to death are quite similar in the two smallest branch diameter classes. Averages calculated after removal of the 35 cankers which died as a result of branch suppression are not much different from those which include all 116 dead cankers. These two studies seem to bear out the belief that canker death is most frequently caused by a combination of two factors. These are (1) flagging of the cankered branch with

^{1/} Length of longest internode(s) crossed refers to length in inches of the longest internode, or group of internodes, over which the canker margin grew toward trunk without reaching a new source of elaborated food such as an internode bearing live needles or a node supporting live lateral branches.

attendant discontinuance in the supply of elaborated food from portions of the branch distal to the canker, and (2) the presence of a long internode, or group of internodes, without live needles or live lateral branches intervening between the canker and the tree trunk.

TABLE 2

CAUSE OF DEATH AND GROWTH POTENTIAL OF FORMERLY THREATENING
DEAD CANKERS --UNIVERSITY OF IDAHO BLISTER RUST STUDY

Branch Diameter Class (Inches)	Cause of Death			Av. Total Length Spread Toward Trunk (Inches)	Av. Length Longest Internode(s) Crossed (Inches)	Av. Length Internode(s) Where Canker Died (Inches)	Average Number of Nodes Crossed	Av. No. of Months of Canker Life
	Suppression of Branch	Flagging: Normal from Parasitism and from Gnawing	Totals					
0- $\frac{1}{4}$	24	27	51	3.34	3.07	5.74	1.2	35.5
$\frac{1}{4}$ - $\frac{1}{2}$	11	50	61	5.76	4.12	6.78	1.4	52.0
$\frac{1}{2}$ - $\frac{3}{4}$	0	3	3	8.10	6.73	7.53	1.0	52.3
$\frac{3}{4}$ -1	0	1	1	5.30	3.90	3.90	1.0	58.0
Totals	35	81	116					
Avs.				4.75	3.73	6.32	1.3	44.8
%	30.2	69.8	100.0					
Avs. Flagged Canks. Only				4.76	3.67	5.92	1.3	46.3

From the two studies outlined above a simplified method for judging cankers, either as harmless or as potentially damaging, was developed for interpreting threatening canker measurements already recorded in the field. All cankers within 24 inches of trunk on branches up to $\frac{1}{2}$ inch in diameter were judged capable of crossing internode(s) up to 6 inches in length; those on branches larger than $\frac{1}{2}$ inch and up to $1\frac{1}{4}$ inches in diameter, up to 9 inches in length. If in the course of the average 6- or 9-inch spread toward trunk the canker margin would grow into an internode with green needles or pass over a node having live lateral branches, the canker was considered capable of continued growth toward trunk according to the diameter of the internode(s) into which it had spread. Extent of blister rust mycelium beyond the visible canker margin was not considered except when the canker under observation was

in the internode(s) nearest to trunk. When this condition existed, an additional inch was added to the length of the longest internode(s) across which the average canker might be expected to spread^{1/}.

In the field, additional data were recorded on age of wood cankered, stage of development of cankers, cankered branch flagging, parasitism by secondary fungi, rodent injury, and insect injury.

3. Determining Blister Rust Damage As Measured by the Percentage of White Pine Crop Tree Stocked Quadrats Depopulated by Blister Rust

Each of the 100 plot quadrats was examined as a unit and the number of crop trees was tallied by species. Quadrats either supported none or from 1 to several crop trees, often of as many different species. Damage to stocked quadrats was then determined by applying the procedures for examination of individual white pine crop trees already outlined, and by considering the unit to be all crop trees in the quadrat rather than the individual crop trees. When a white pine stocked quadrat was found to contain one or more healthy or harmlessly infected white pine crop trees it was recorded as adequately stocked. Contrariwise, when the quadrat contained only trunk cankered crop trees or crop trees with potentially damaging branch cankers it was considered to represent a loss in growing space attributable to blister rust. Instances were found where the release of non-crop trees, then intermediate in dominance, would soon be brought about by the top-flagging and death of trunk cankered crop trees. Such trees were tallied separately as "intermediate replacements" which would adequately stock the quadrat otherwise depopulated by the rust. A stand tally was taken by heights, including all trees of all species on the plot.

DISCUSSION AND RESULTS

During the 1947 field season 24 plots were established and examined. Difficulty in making preliminary surveys of stocking and rust intensity prior to plot examination resulted in 6 of the plots being similar in specifications to others already examined. The 24 plots, therefore, included approximately half of the combinations of age class, stocking intensity, and rust intensity desired to complete the sampling plan. Plot numbers, specifications, and locations are shown in Table 3. Rust intensities shown in Tables 3 and 4 are not necessarily general for the locality or National Forest. They represent only the plot sites selected to fall in a given rust intensity class.

Table 4 gives the results for the 24 plots. The left half of the table gives the percent of quadrats occupied by white pine crop trees (stocking intensity), the percent of crop trees infected (rust intensity), and the corresponding damage expressed as percent of crop trees damaged or as percent of crop tree occupied quadrats depopulated. The right half of the table shows the estimated numbers of white pine (both crop and non-crop trees) per acre, the total number of crop trees of all species per acre, and the number of evenly spaced white

^{1/} See Ehrlich, John, and Robert S. Opie. Mycelial extent beyond blister rust cankers on Pinus monticola. Phytopath. 30(7): 611-620; July 1940.

pine crop trees per acre (stocked quadrats per acre). The acre totals may be of some help in interpreting the stocking and damage figures. The plot percentages are arrayed by stocking intensity groups to show the apparent effect of stocking intensity on stocked quadrat depopulation. It will be remembered that the stocking plan is incomplete and that means are necessarily biased by unequal numbers of plots in the various stocking, rust, and age classes.

TABLE 3

NUMBERS, SPECIFICATIONS, AND LOCATIONS OF PLOTS EXAMINED IN 1947

Age Class	Plot No.	Stocking Intensity	Rust Intensity	Location
0-10	9	Medium	Light	Ames Creek, Coeur d'Alene Natl. Forest
	13	"*	"	Mutton Gulch, Clearwater Natl. Forest
	22	"	"	Reeds Creek, north side, Clearwater Natl. Forest
	4	Medium	Medium	Cameron Creek, Cedar Camp, St. Joe Natl. Forest
	12	Heavy	Light	Washington Creek, Clearwater Natl. Forest
	14	Heavy	Medium	Reeds Creek, south side, Clearwater Natl. Forest
11-20	20	Light	Light	New Shea Meadows Road, south side, St. Joe N.F.
	7	Medium	Light	Oviat-Cameron Creeks Summit, St. Joe N. F.
	8	"	"	Oviat Creek, Burn at Head, St. Joe Natl. Forest
	23	Medium	Medium	Incline Lookout, St. Joe Natl. Forest
	1	Medium	Heavy	Sherwin Summit, St. Joe Natl. Forest
	6	Heavy	Light	Oviat Creek, West Side, St. Joe Natl. Forest
	15	Heavy	Medium	Bottom Creek Mouth, Coeur d'Alene Natl. Forest
21-40	16	"	"	Burnt Cabin Creek, Coeur d'Alene Natl. Forest
	21	Light	Medium	New Shea Meadows Road, north side, St. Joe N.F.
	2	Light	Heavy	Cedar Creek, St. Maries River, St. Joe N. F.
	5	"	"	Keeler Creek, St. Joe Natl. Forest
	11	Medium	Heavy	Clarkia Ranger Station, St. Joe Natl. Forest
	10	Heavy	Medium	Deception Creek, Coeur d'Alene Natl. Forest
	19	Heavy	Heavy	Gold Center Creek, St. Joe Natl. Forest
41-60	18	Light	Heavy	Gold Center, St. Joe Natl. Forest
	24	Medium	Heavy	Clarkia BRC Hdqrs., St. Joe Natl. Forest
	3	Heavy	Heavy	Flewsie Creek, St. Joe Natl. Forest
	17	"	"	Middle Fork St. Maries River, St. Joe N. F.

* Dittos indicate plots of similar specifications.

In all but 4 of the 24 plots the percent of crop trees damaged by the rust is estimated to be less than the percent infected by the rust. The younger trees appear to be more susceptible to rust damage, for three of the four plots (Numbers 8, 13, and 22) showing damage equal to infection are in the youngest age classes. The fourth plot (Number 17) lies in the locality of an early infection center where the rust, even on the 50-year-old poles, is extremely intense. The other twenty plots contained at least a few crop trees which were adjudged harmlessly infected. In all but 2 of the 24 plots the percent of western white pine crop tree stocked quadrats judged as depopulated by the rust is less than the percent of crop trees judged damaged by the rust. Apparently an inverse relationship exists between intensity of stocking and degree of rust damage to stocked quadrats. Proportionally fewer quadrats are depopulated on the medium and heavily stocked plots than on the lightly stocked plots. It will be noted

that where stocking is extremely heavy (i.e., Plot 14, Reeds Creek, with more than 5,000 white pine per acre and 98 percent of its quadrats stocked with white pine crop trees) the difference between the amount of damage calculated from the number of crop trees lost and the amount of damage calculated from the number of stocked quadrats depopulated is as much as 40 percent. For the entire 24 plots, percentages of damage based on loss of crop trees are about $1\frac{1}{2}$ times as great as those based on depopulated quadrats. The mean value for quadrats depopulated is 25.8 percent, that for trees damaged 38.2 percent or about $1\frac{1}{2}$ times as great.

SUMMARY

1. The present report shows the progress made in an incomplete study into the effects of stocking, rust intensity, and age of trees on the percentages of blister rust damage calculated from numbers of trees damaged and from numbers of stocked quadrats depopulated.
2. A method is described in which crop trees are designated within quadrats which increase in size with stand age. The average lengths of unneeded internodes without live branches, which may be expected to cause canker death following branch flagging are employed in a new method of judging which white pine crop trees are rust damaged and which quadrats are depopulated by the rust.
3. Mean percentages of trees damaged and of quadrats depopulated are biased by inequality in numbers of plots among the various stocking intensity, rust intensity, and age classes. In general, a strong trend is indicated toward overestimating the amount of rust damage when using number of crop trees lost, regardless of their position on the ground. The mean percentages of crop trees lost and of stocked quadrats depopulated on the 24 plots indicate that percent of damage estimations based on lost trees will exceed by approximately $1\frac{1}{2}$ times those based on depopulated quadrats.

TABLE 4

PERCENTAGE OF WHITE PINE CROP TREES AND WHITE PINE STOCKED QUADRATS LOST DUE TO BLISTER RUST,
PER ACRE TOTALS FOR CROP TREES (ALL SPECIES) AND FOR WESTERN WHITE PINE CROP TREES,
TOTAL NUMBER OF WHITE PINES PER ACRE

Plot Number	Age Class	Percent Quadrats WPP Stocked	Percent Crop Trees Infected	Percent Crop Trees Damaged	Percent WPP Quadrats Depopulated	Total No. WPP Per Acre	Total No. Crop Trees Per Acre (All Species)	WPP Crop Tree Stocked Quadrats Per Acre		
								Depopulated	Unharmed	Total
2	21-40	16	100.0	94.1	87.5	102	213	62	9	71
5	21-40	28	67.8	39.4	39.3	121	266	38	59	97
18	41-60	28	100.0	80.0	78.6	162	153	60	17	77
20	11-20	20	28.6	19.0	20.0	92	608	17	67	84
21	21-40	25	51.7	17.2	16.0	118	256	14	73	87
Lt. Stocking Aves. 23.4			70.4	48.9	47.0	119.0	299.2	38.2	45.0	83.2
1	11-20	55	87.5	38.5	30.9	1040	1040	170	380	550
4	0-10	52	61.1	55.7	36.5	697	978	88	155	243
7	11-20	52	17.3	16.0	9.6	390	507	21	197	218
8	11-20	39	5.7	5.7	0.0	289	436	0	163	163
9	0-10	54	25.0	21.9	9.3	899	538	24	229	253
11	21-40	60	90.0	38.8	26.7	564	401	56	152	208
13	0-10	57	7.8	7.8	0.0	894	622	0	267	267
22	0-10	52	31.6	31.6	11.5	941	842	28	215	243
23	11-20	46	52.5	45.9	37.0	302	1014	71	122	193
24	41-60	37	85.0	32.5	21.6	216	340	22	79	101
Med. Stocking Aves. 50.4			45.1	31.4	18.5	623.2	671.8	48.0	195.9	243.8
3	41-60	82	98.0	65.1	46.3	543	435	95	110	205
6	11-20	80	25.9	18.4	3.8	2455	867	12	323	335
10	21-40	96	66.9	19.2	8.3	3564	571	28	304	332
12	0-10	79	13.4	11.9	5.1	2059	749	19	351	370
14	0-10	98	49.7	47.4	7.1	5368	1292	23	426	459
15	11-20	83	38.8	10.8	3.6	3092	750	13	335	348
16	11-20	69	35.5	29.0	17.4	1852	729	50	239	289
17	41-60	72	81.7	81.7	88.9	647	548	175	22	197
19	21-40	87	99.4	84.5	75.9	1754	882	228	73	301
Hvy. Stocking Aves. 82.9			56.5	41.1	27.5	2370.4	758.1	71.4	242.6	315.1
Grand Averages		57.0	53.4	38.2	25.8	1173.4	626.5	54.8	182.0	237.1

BLISTER RUST INVESTIGATIONS IN 1947

Infection Conditions During 1947

For the reason studies are of damage in stands of advance reproduction and pole, a few excerpts are made from T. S. Buchanan's 1938 report "Blister Rust Damage to Merchantable Western White Pine" to recall to mind the relationship between time required for damage with the size of tree. "Damage may occur within 5 years after infection in the smaller sizes while significant damage in merchantable trees may not occur until 30 or more years after infection." As an example Buchanan estimated that trees with killing cankers and 16.8 feet in height would be damaged in 5 years, trees 37.0 feet in height in 7 years, trees 67.4 feet in 9 years, trees 87.0 feet in 13 years, trees 117.4 feet in 15 years, and trees 157.2 feet in height in 20 years. The time required for damage may well be expected to be shortened by the dual action of new damage cankers and the increase in twig and branch infections if the trees continue to be exposed to ribes infected with the rust, according to Buchanan.

The inspection of ribes on plots widely distributed over northern Idaho in August revealed more bushes and leaves infected this year than in 1946 but the amount of rust was considerably less. This indicates weather conditions in the spring were favorable for spread of the rust from pine to ribes but less favorable during the summer for rust development and intensification on ribes leaves due to the very dry July and August season. The abnormally wet fall season with cool air temperatures produced ideal weather conditions for pine infection. All factors indicate that spread of the rust from ribes to pine probably amounted to a major wave of infection. With such indications, areas of white pine reproduction and pole which have numerous ribes present or in close association and are known to have 35 to 50 per cent infection probably have been damaged beyond the point where any further economic value can be attached to the present stand of pine. Such areas should be given low priority for the next three years until the amount of infection can be definitely determined.

Crystal Creek Plot 11 (T. 44 N., R. 1 E., secs. 16, 21, St. Joe Operation)

This plot was established in 1937. No eradication of ribes has been done on the area. The trees are now approximately 30 years old. The plot is one chain wide and 45 chains long at right angles to the contours. In 1937 the pine were completely inspected. Ribes viscosissimum averaged 201 bushes with approximately 5,000 feet of live stem per acre. Although no detailed check of the ribes was made in 1947, the number of bushes appeared to be approximately the same but the live stem had decreased. In 1937 the pine were found to be 67 per cent infected. In 1947, 135 trees in groups of five per chain were inspected. Of the 97 per cent of the trees found infected, 5 per cent are without killing cankers, 36 per cent have trunk cankers, and 56 per cent are dead. Since the stand had 67 per cent infection in 1937, the 1937 wave completed the destruction of the economic value of this stand. In other words, the presence of the disease in this stand for 14 years seriously damaged this stand.

Middle Fork St. Maries River Plot (T. 42 N., R. 2 E., secs. 23, 24, St. Joe Operation)

This plot, established in 1937, consists of a strip one chain wide and 25 chains long. It starts at the junction of the road and Braum Creek (formerly Foolhen Creek), and runs perpendicular to the contours. The stand consists of a 20- to 40-year age class of white pine, Douglas fir, white fir, hemlock, and cedar. The complete inspection of this plot in 1937 showed that 41.5 per cent of the trees was infected and that approximately half of the infected trees would be killed. In 1947 the plot was checked again by examining five dominant or co-dominant trees at half chain distances. A total of 228 trees was examined. This inspection revealed 92 per cent infection, all but 3 per cent being fatal. The results are essentially in agreement with those reported in serial No. 139 for an area two miles north and one mile west of this plot in the same age class. Apparently a large portion of this young age class white pine in the drainage must be considered lost from blister rust with the result that the stand at maturity will consist of Douglas fir, white fir, hemlock, and cedar. Incidental to the pine inspection five R. lacustre were found. An analysis of the killing cankers, that is, one canker for each tree, indicated an accumulative increase of the rust as follows: .88 per cent in 1923, 6.14 per cent in 1927, 19.74 per cent in 1933, 55.70 per cent in 1937, 87.72 per cent in 1941, and 89.47 per cent in 1943-44. These results emphasize the necessity of timing eradication work according to the progress of the disease. These data show that the stand was seriously damaged by 1937, that is, fourteen years after the introduction of the disease. Apparently, control must be established within 14 years after the date the disease is introduced. The establishment of control in less time will reduce the chances of getting major losses from the rust. The plot was first eradicated of ribes in 1934 at the time crews were working adjoining areas and reworked in 1940 and 1946.

Squaw Creek (T. 40 N., R. 2 E., secs. 30, 19, 20, St. Joe Operation)

Part of the stand on this area is a moderately stocked stand of reproduction approximately 20 years old and part is a pole stand 60 to 80 years old. Three random spot checks were made in the reproduction consisting of 50 trees for each of two cases and 75 in the other. These samples were taken about a half-mile apart. Because of the similarity of the results from the three locations no further samples were taken and the results from the three samples were combined. These data indicated that approximately 89 per cent of the trees have visible infection and that 76 per cent of all the trees have killing cankers. An analysis of killing cankers indicated that the disease had progressed as follows: approximately 11 per cent originated in 1933; this increased to 39 per cent in 1937, 65 per cent in 1941, and 76 per cent in 1944. The high percentage originating in 1933 suggests that the disease probably originated somewhat earlier in adjacent older stands.

In the pole stand 16 dominant or codominant trees approximately 80 feet tall in four different locations were thoroughly examined. Approximately 88 per cent of the trees was infected, and 75 per cent of all the trees had killing cankers. These results were so similar to those in reproduction that no further samples were taken. The only difference was that infection of 1923 and 1927 origin was found. This small sample also indicated that the progress of

the disease in the pole stand was approximately the same as that in the reproduction. These results also suggest that pole stands may be as seriously damaged as reproduction by exposure to the rust for the same length of time.

The samples from both of these age classes indicate that control should have been established by 1937 or approximately 14 years after the disease became established in order to save the stand from serious loss. Sections 19 and 20 were given first working in 1934 and reworked in 1939. Section 30 was first worked in 1933 and reworked in 1939.

Upper Basin (T. 40 N., R. 2 E., sec. 2, and T. 41 N., R. 2 E., sec. 26, St. Joe Operation)

This area was logged about 1930. Although the tree population of almost pure white pine is not heavy, the trees are well distributed so that the area is well stocked with a 15- to 20-year age class.

In sections 2 and 26 all the trees were inspected on .6 of an acre in each case. A total of 195 trees were examined, 93 in the first case and 102 in the second. The samples were taken about two miles apart. Since the samples were so similar the data were combined. All trees were found visibly infected except one. Approximately 95 per cent of the trees had killing cankers. Fourteen per cent of the killing cankers originated in 1933, increasing to 65 per cent by 1937, 92 per cent by 1941, and 95 per cent in 1944. The high per cent infection originating in 1933 indicates that the rust was already established in the vicinity when the white pine germinated. Due to the fact that the ribes germinated with pine and continued to germinate for four or five years, the rust developed so rapidly in this area that no attempt has been made to establish control of the rust. This area was worked once by CCC crews during the period of 1933 to 1935.

Quartz Creek (T. 37 N., R. 5 E., secs. 4, 8, Clearwater Operation)

A random check of nine dominant trees in this 50-70 year age class, ranging from 75 to 105 feet tall, showed that 89 per cent of the trees examined were infected. All of the infected trees had killing cankers.

Blister Rust Headquarters (T. 36 N., R. 5 E., sec. 10, Clearwater Operation)

An opportunity was offered to examine 11 trees in this area which had been felled recently by a right-of-way crew. The area had been logged in 1941, consequently these were residual trees. The trees were 70 to 90 years old and 50 to 125 feet tall. This sample showed 91 per cent of the trees infected with blister rust. Sixty per cent of the infected trees had probable killing cankers. No cankers older than 1941 were found.

Powder House Area (T. 37 N., R. 5 E., sec. 27, Clearwater Operation)

Fifteen trees in the 50-60 year old white pine stand west of the Powder House plot were examined. The trees are 60 to 80 feet tall. Only dominant and co-dominant trees were inspected. The results of this examination showed that 93 per cent of the trees are visibly infected and 80 per cent of the trees examined had killing cankers. Of the 12 trees with killing cankers, the cankers

originated were as follows: 1 in 1923, 2 in 1927, 3 in 1933, and 6 in 1941. Cankers found on the trees were as follows: 1 in 1923, 2 in 1927, 5 in 1933, 31 in 1937, 71 in 1941, and 2 in 1944. Eradication of the ribes on the area in 1933 and 1936 reduced them to approximately 2 bushes per acre. Apparently these were enough ribes to continue spread of the rust on ribes.

General Conclusions from Sampling of White Pine Pole Stands

Although the samples in pole stands are small, the results suggest that the damage may be as severe in pole as in reproduction. Because of the length of time required for these trees to be girdled, the loss will be gradual and not apparent for some time. However, the loss is certain since as soon as the tops die out or are blown out the associated trees may suppress the remaining lateral branches and the trees will die. Since the sample trees were dominant and co-dominant trees the percentages represent the loss of crop trees. The data also indicate that the ribes must be quite thoroughly eradicated from a stand within approximately fifteen years after the introduction of the rust if serious losses are to be prevented. The proper timing of eradication work is fundamental to the success of the control program. Although examination of pole stands is slow and difficult work, steps should be taken to examine all pole stands in the control area in order that further eradication work or salvage cuttings may be most effectively planned.

Tuberculina maxima

Although this parasite of blister rust cankers has been observed on individual trees over most of the white pine region of northern Idaho, this is the first season it has spread to such an extent that it will be a real factor in reducing aecial production. In one area on the Powder House Plot where a considerable number of the trees had trunk cankers, 80 per cent of these cankers were infected with Tuberculina maxima, many being completely covered with this parasite. Another area on Trail Creek Plot 6 had 14 per cent of the old cankers infected with this parasite. An examination of the infected cankers indicated that the parasite had spread rapidly during the last two years. Permanent plots were established around these two centers in order to follow the spread of the parasite during the next few years.

III. LABORATORY, GREENHOUSE, AND SPECIAL ACTIVITIES

At Berkeley, principal laboratory and greenhouse activities were (1) testing of new herbicides on ribes that have been resistant to dilute 2,4-D formulations, (2) germination tests on ribes seed, especially the effects of 2,4-D on seed viability and the viability of seed-extracted soils from representative pine areas, (3) conferences with technicians of spray equipment industry with special reference to light weight sprayers for jeep or pickup truck and to methods and equipment for spraying 2,4-D by helicopter and by fixed wing aircraft. In furnishing new organic compounds for testing as herbicides, the Division of Insecticide Investigations (Dr. R. C. Roark) has been especially helpful. Of the many new formulations tested, salts and esters of high grade 2,4,5-trichlorophenoxyacetic acid were the only ones sufficiently promising to justify field tests in 1947. On greenhouse-grown Ribes lacustre, R. viscosissimum, R. lobbi, and R. binominatum, the ester of 2,4,5-T in kerosene 1,000 p.p.m. or more has been 100 per

cent effective. Preliminary observations on field plots treated with 2,4,5-T are not conclusive, suggesting that field plants will be harder to kill than greenhouse plants. Further field tests on dilute and concentrated high grade 2,4,5-T salts and esters and further studies on the seasonal effect of these 2,4,5-T compounds as influenced by the purity of the herbicide are now needed.

At Spokane, a study was made to determine the usefulness of soil analysis by rapid chemical tests in judging the potential ribes problem prior to reaching decisions relative to the most desirable cutting practice for a stand of timber. The conclusion reached was that soils do not provide a reliable index of ribes potentials, but along with fire history of an area, considerable importance can be attached to soil fertility as related to fire history and the potential problem of ribes. These results corroborate similar work undertaken at Berkeley on soil samples collected from typical sugar pine areas. Other incompleeted projects include (1) the improvement of techniques in preconditioning white pine seed for direct sowing, (2) germination of stored ribes seed recovered from undisturbed forest soils following logging and fire to determine period of longevity after a major forest disturbance, (3) propagation of ribes in laboratory for preliminary chemical tests, (4) development of workable techniques for rooting white pine cuttings from supposedly rust resistant trees, and (5) correlation of weather data with years of varying pine infection.

During 1947 the following published papers or special reports dealing with the above-mentioned subjects were prepared by methods personnel:

Bureau MS 7974:

Germination of Phacelia Seeds.

Madrono, Jan. 1947. IX: 17-20.

. C. R. Quick

Bureau MS 8411:

The Control of Weed Hosts of Plant Diseases.

Ninth Annual Western States Weed Control Conference, pp. 18-21.

Portland, Ore. Feb. 6-7, 1947.

. H. R. Offord

Serial No. 134:

Effects of Logging of Virgin Timber on Ribes Regeneration in the Central Sierra Nevada.

. C. R. Quick

Serial No. 135:

Experimental Germination of Ribes and Pine Seeds.

Series of 1945.

. C. R. Quick

Serial No. 136:

Germination Tests on Sugar Pine Seed.

. C. R. Quick

Serial No. 137:

Some Experimental Aspects of Ribes Seed Longevity.

. C. R. Quick

Serial No. 138:

Pruning White Pine Reproduction to Salvage a Stand Heavily Infected
with White Pine Blister Rust.

. C. R. Stillinger

Serial No. 139:

Blister Rust Damage to Pole-Sized Western White Pine on the Middle
Fork of the St. Maries River.

. R. T. Bingham

Serial No. 140:

Preliminary Report on the Ames Creek Small Bush Study.

. R. T. Bingham

Serial No. 141:

Factors Related to the Effective Use of 2,4-D for Ribes Eradication.

. H. R. Offord



PHOTOGRAPHIC AND EDUCATIONAL WORK, 1947

By

Frank O. Walters, Assistant Regional Leader

H. Miller Cowling, Photographic Specialist

A. Photographic Section

A large volume of work was turned out by the photographic section during the past year. Manuals were revised and copies multilithed as follows: Checking Manual 200, Ribes Eradication Manual 400, Ribes Eradication Training Manual 220. For maps and training charts 2,700 yards of black line paper was processed.

The photographer directed the big job of coloring the enlarged pictures used in the ribes eradication training charts. He also assisted a director and photographer from the division of motion pictures in the filming of the north-western blister rust film and in taking the western scenes for the over-all film.

The following tabulation shows the materials processed by this section:

PHOTOGRAPHIC, MULTILITH, BLACK LINE, AND MIMEOGRAPH WORK

Item	North- western Region	Pacific Coast Region	Pear Psylla Control	Total
PHOTOGRAPHIC				
Lantern slides, natural color	60			60
Films developed, field films	162			162
Copies, 5x7	17	2	72	91
8x10	72	27		99
Printing, 4x5 or smaller		21		21
5x7	1,334	100		1,434
8x10	33			33
9x11	415	514		929
Enlarging, 16x20		226	56	282
22x28	100			100
28x34	65			65
30x40	19			19
Total Items	2,277	890	128	3,295
MULTILITH				
Copies	253	23	7	283
Plates made	251	22	8	281
Cards printed	6,500		7,500	14,000
Cards printed, reverse	3,000		7,500	10,500
Total Cards	9,500		15,000	24,500
Paper printed	157,100	16,800	12,600	186,500
Paper printed, reverse	46,500	1,000	500	48,000
Total Paper	203,600	17,800	13,100	234,500
Total Items	213,604	17,845	28,115	259,564
BLACK LINE PRINTER				
Total maps printed	2,882		1,029	3,911
MIMEOGRAPH				
Total paper	8,695			8,695
Grand Total All Items	227,458	18,735	29,272	275,465

B. Educational Section

Members of the Northwest Conservation League were housed over night at a camp on the Clearwater operation. They were given a talk on white pine blister rust by the operation supervisor, followed by an informal discussion.

The Idaho State Land Board spent a day inspecting blister rust control work on the Clearwater Timber Protective Association. The first part of the ribes eradication training chart series was used to give the board members a background for an understanding of the disease and its methods of control.

When a thorough job of instruction is done by the supervisors in matters pertaining to the disease, a good cross section of the United States is reached since the personnel comprising the eradication crews is recruited from all parts of the country. The visual aid given by the eradication training charts has been of material aid in making these presentations.

Blister rust literature was available to all workers and 153 pamphlets were distributed to visitors in the Spokane office.

Talks, Slides, Displays and Motion Pictures

For 5 weeks a blister rust display occupied a window on the main street of Thompson Falls, Montana. The Balopticon, using a series of slides showing disease, stands of healthy pine and procedures in control work, was the central attraction. Wing panels carried colored display posters. Natural specimens of ribes and pine were shown. Whole and sectioned cankers were on display. The ribes tool and samples of chemicals used in control work were exhibited.

At the Audio-Visual Educational Conference held in Billings, Montana, an exhibit was presented using the Balopticon with a series of blister rust control slides. Colored enlargements of white pine stands and milling scenes formed the background for a display of potted specimens of diseased and healthy pine and ribes. Valuable constructive criticism was received which will be used in developing future exhibits. A similar showing made at the Bonner County fair held in Sandpoint, Idaho, was viewed by large crowds.

The Western blister rust film was shown before approximately 1,000 blister rust workers. Eight other showings were made before 325 people.



APPROPRIATIONS
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NORTHWESTERN REGION OF BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1947:

Project 3101.14 N.W. (Administrative)	\$137,500.00	
Project 3103.14 N.W. (Cooperative)	<u>657,711.00</u>	\$795,211.00

Fiscal Year 1948 (as of 12/31/47)

Project 3101.14 N.W. (Administrative)	\$124,000.00	
Project 3103.14 N.W. (Cooperative)	<u>125,000.00</u>	\$249,000.00

Contributed Funds (deposited with U. S. Treasury)

State of Idaho		\$ 15,000.00	
Clearwater Timber Protective Association	\$6,422.40		
Potlatch Timber Protective Association	5,420.30		
Priest Lake Timber Protective Association	<u>4,066.54</u>	<u>15,909.24</u>	\$ 30,909.24

STATE OF NEW YORK

IN SENATE
January 1, 1900

REPORT OF THE

COMMISSIONERS OF THE LAND OFFICE
IN RESPONSE TO A RESOLUTION PASSED BY THE SENATE
MAY 1, 1899

ALBANY:
J. B. LIPPINCOTT & CO. PRINTERS
1899

TABLE 1

FEDERAL EXPENDITURES, NORTHWESTERN REGION OF BLISTER RUST CONTROL
CALENDAR YEAR 1947, REGULAR APPROPRIATIONS

Project		Salaries	Expense	Total
January 1 to June 30, 1947				
I	Planning, Coordination, Technical Direction			
1.1	- Clearwater Operation, Idaho	\$ 6,468.74	\$ 177.30	\$ 6,646.04
1.2	- St. Joe Operation, Idaho	8,688.26	494.50	9,182.76
1.3	- Coeur d'Alene Operation, Idaho	4,030.57	53.90	4,084.47
1.4	- Kaniksu Operation, Idaho	9,252.73	171.76	9,424.49
1.6C	- Cabinet Operation, Montana	1,140.09	85.94	1,226.03
1.6K	- Kootenai Operation, Montana	1,140.10	85.94	1,226.04
1.7	- National Parks	2,736.85	395.21	3,132.06
1.A	- Office Maintenance	20,612.27	4,066.96	24,679.23
1.B	- Supervision	6,170.67	835.82	7,006.49
1.C	- Education and Information	3,269.26	41.57	3,310.83
1.D	- Control Investigations	235.00		235.00
1.E	- Methods Development		12.84	12.84
Total, Project I, Jan. 1 - June 30, 1947		\$ 63,744.54	\$ 6,421.74	\$ 70,166.28
III	Cooperative Ribes Eradication on State and Private Lands			
3.1	- Clearwater Operation, Idaho	\$ 40,647.85	\$ 70,578.63	\$ 111,226.48
3.2	- St. Joe Operation, Idaho	37,907.48	76,910.57	114,818.05
3.4	- Kaniksu Operation, Idaho	42,519.29	77,028.82	119,548.11
Total, Project III, Jan. 1-June 30, 1947		\$ 121,074.62	\$ 224,518.02	\$ 345,592.64
July 1 to December 31, 1947				
I	1.1 - Clearwater Operation, Idaho	\$ 4,368.68*	\$ 232.84	\$ 4,601.52
	1.2 - St. Joe Operation, Idaho	4,923.98*	720.42	5,644.40
	1.3 - Coeur d'Alene Operation, Idaho	*	114.30	114.30
	1.4 - Kaniksu Operation, Idaho	4,903.84*	151.09	5,054.93
	1.6C - Cabinet Operation, Montana	*	74.27	74.27
	1.6K - Kootenai Operation, Montana	*	74.27	74.27
	1.7 - National Parks	4,117.55	789.91	4,907.46
	1.A - Office Maintenance	16,693.15	4,857.38	21,530.53
	1.B - Supervision	6,085.96	444.29	6,530.25
	1.C - Education and Information	2,475.45	165.55	2,641.00
	1.D - Control Investigations			
	1.E - Methods Development		88.26	88.26
Total, Project I, July 1-Dec. 31, 1947		\$ 43,568.61	\$ 7,692.59	\$ 51,261.19
III	3.1 - Clearwater Operation, Idaho	\$ 29,407.57	\$ 2,978.51	\$ 32,386.08
	3.2 - St. Joe Operation, Idaho	35,177.16	1,814.69	36,991.85
	3.4 - Kaniksu Operation, Idaho	39,546.31	1,085.13	40,631.44
Total, Project III, July 1-Dec. 31, 1947		\$ 104,131.04	\$ 5,878.33	\$ 110,009.37

*Salaries of operation supervisors or assistants for 7/1 - 12/27/47 repaid to our appropriation by Forest Service, not included in these totals.

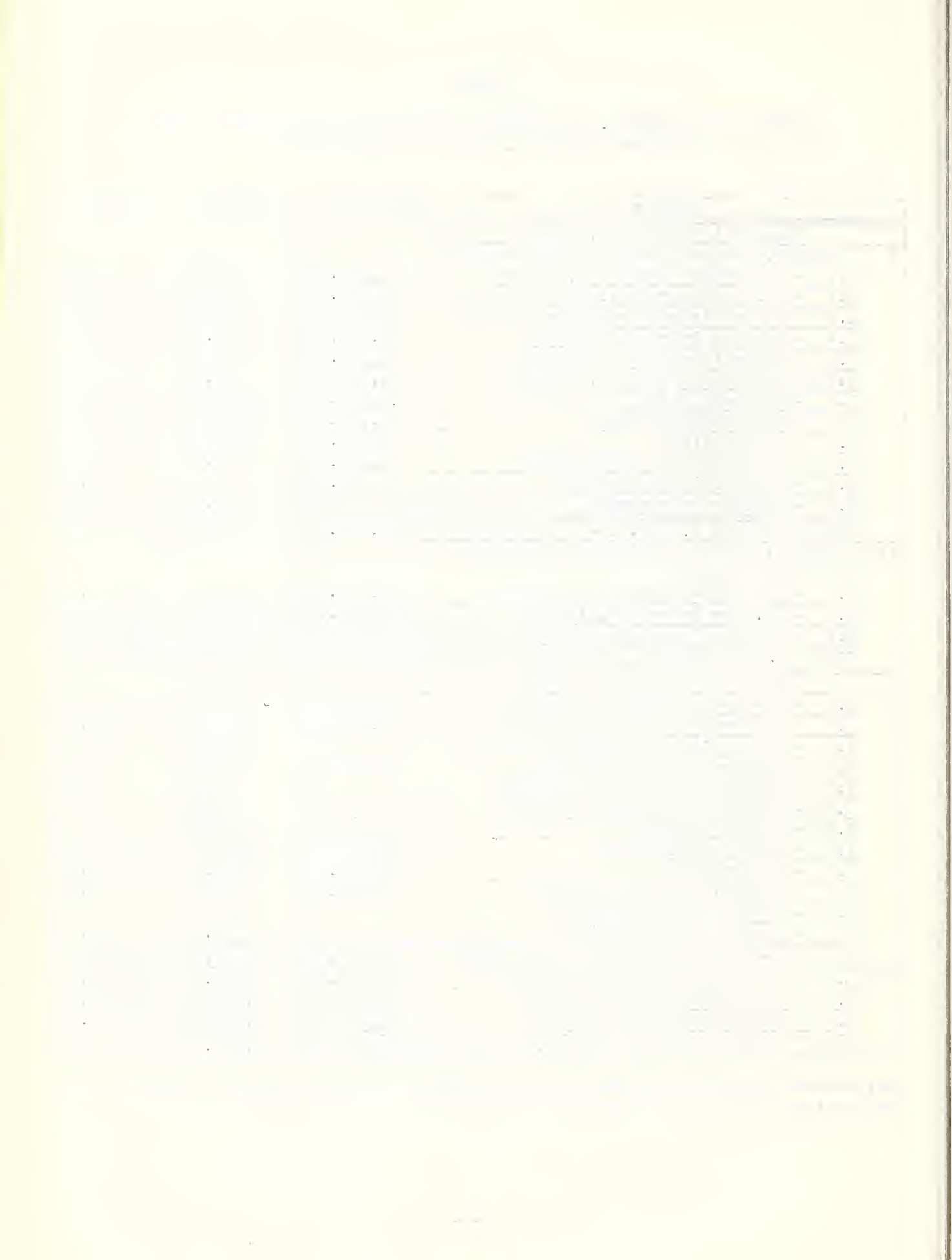


TABLE 2

SUMMARY OF EXPENDITURES FROM STATE AND
PRIVATE FUNDS, 1926 - 1947, IDAHO

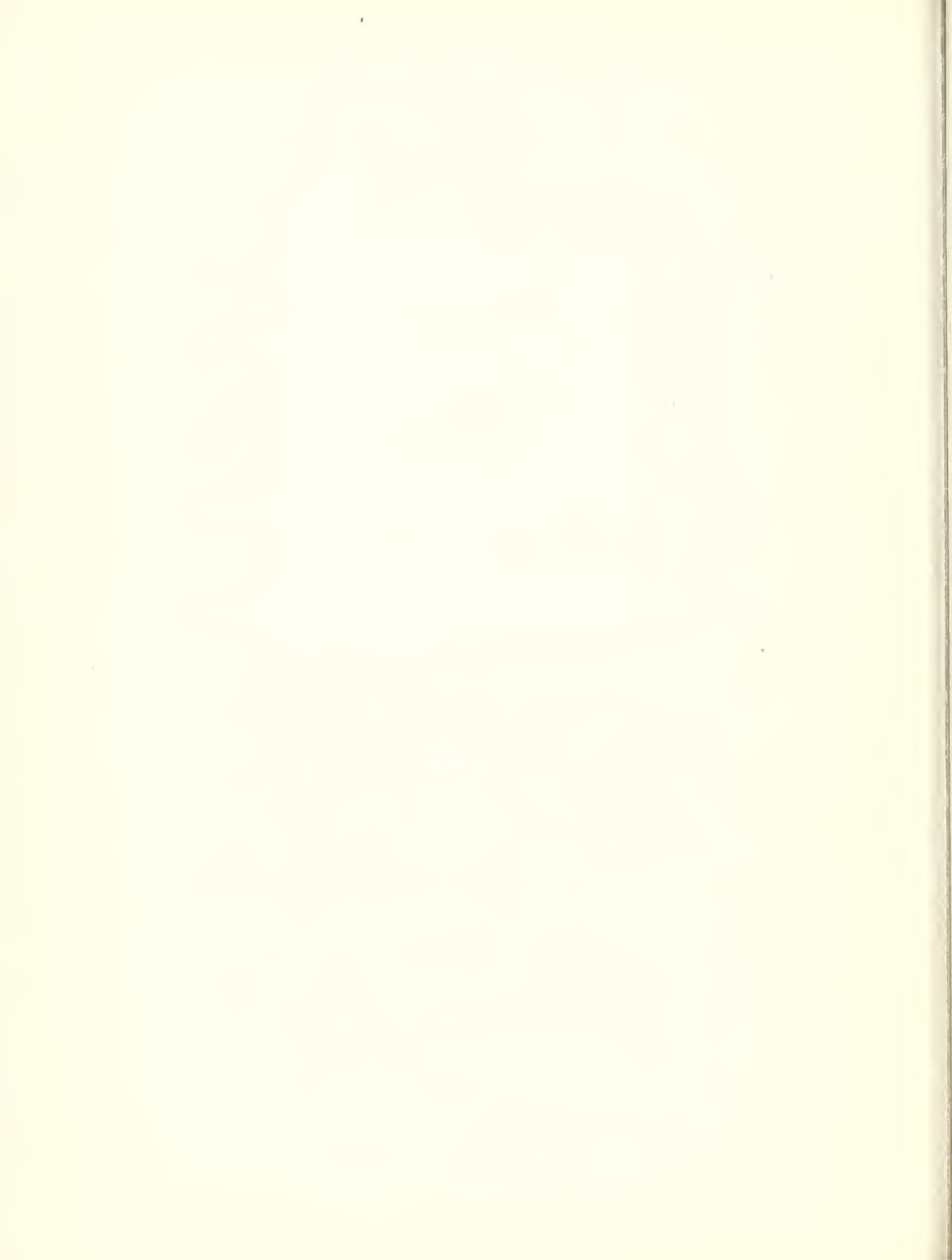
Year	State	Private	Total
1928	\$ 2,518.55	\$ 2,264.32	\$ 4,782.87
1929		19,027.66	19,027.66
1930		20,000.00	20,000.00
1931	5,000.00	35,905.32	40,905.32
1932	8,003.43	11,186.33	19,189.76
1933			
1934	29,154.06		29,154.06
1935	15,000.00		15,000.00
1936	16,998.25		16,998.25
1937	15,001.25		15,001.25
1938	15,000.44		15,000.44
1939	15,438.04		15,438.04
1940	10,034.48		10,034.48
1941	7,542.73	15,756.40	23,299.13
1942	22,761.68	15,440.78	38,202.46
1943	12,252.13	386.68	12,638.81
1944	12,506.60	15,612.96	28,119.56
1945	6,287.68	5,111.03	11,398.71
1946	14,943.35	26,651.55	41,595.00
1947	15,028.11	15,909.24	30,937.35
Total	\$223,470.78	\$183,252.39	\$406,723.17



Organization of the Northwestern Regional Office - 1947

1. Regional Leader in Charge, H. E. Swanson, Pathologist
2. Assistant Regional Leader, F. O. Walters, Pathologist
3. Cooperative Local Control:
 - a. *Clearwater Operation, Idaho:
Operation Supervisor, M. C. Riley, Forester
Assistant Operation Supervisor, H. J. Faulkner, Forester
 - b. St. Joe Operation, Idaho:
Operation Supervisor, H. J. Hartman, Forester
Assistant Operation Supervisor, W. F. Painter, Pathologist
Unit Supervisor, R. H. Kliever, Agent
Special Duty Assistant, R. E. Myers, Agent
 - c. Coeur d'Alene Operation, Idaho:
Operation Supervisor, A. L. Pence, Jr., Forester
 - d. Kaniksu Operation, Idaho-Washington:
Operation Supervisor, H. A. Brischle, Pathologist
Unit Supervisor, L. J. Easley, Agent
Checker Foreman, G. M. Houghton, Agent (resigned 11/10/47)
 - e. Montana Operation:
Operation Supervisor, A. S. Skoglund, Pathologist
 - f. National Parks, Washington, Montana, Wyoming:
Operation Supervisor, J. C. Gynn, Pathologist
Assistant Operation Supervisor, C. M. Chapman, Pathologist
4. Projects:
 - a. Education and Information:
H. M. Cowling, Photographic Specialist
J. C. Gonyou, Draftsman
 - b. Methods Development and Control Investigation (BLR-1-6):
V. D. Moss, Forest Ecologist
J. F. Breakey, Pathologist
C. R. Stillinger, Pathologist
R. T. Bingham, Agent
(Personnel assigned to Northwestern Region by H. R. Offord)
5. Business Administration and Clerical:
 - a. E. G. Schmidt, Administrative Assistant
E. K. LaPrey, Storekeeper
L. C. Miller, Automobile Mechanic
 - b. M. L. McWold, Administrative Assistant
M. P. Kirsten, Clerk
M. C. Yourt, Clerk
 - c. J. R. Pringle, Clerk (resigned 10/3/47)
M. Wilson, Clerk
A. B. Treffry, Clerk-Stenographer
M. I. Williams, Clerk-Stenographer
 - d. L. E. Klatt, Administrative Assistant, Personnel
K. P. Schofield, Clerk-Stenographer

*F. J. Heinrich, LWOP since 7/1/47







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